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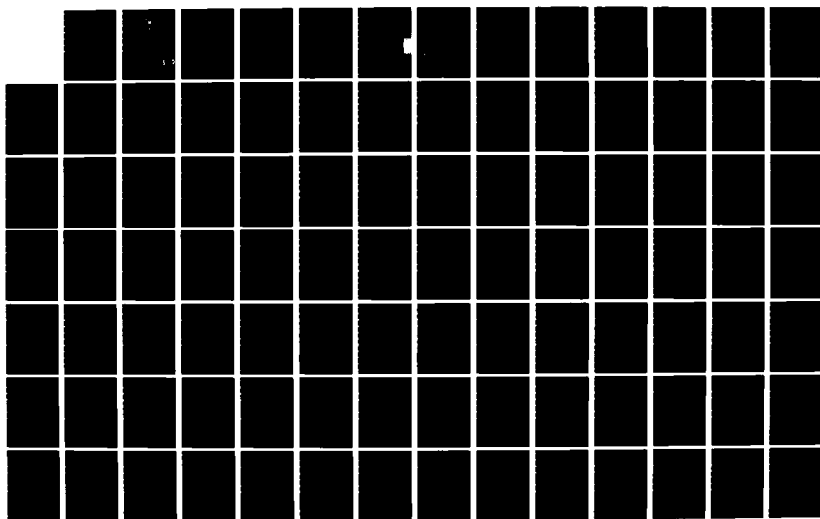
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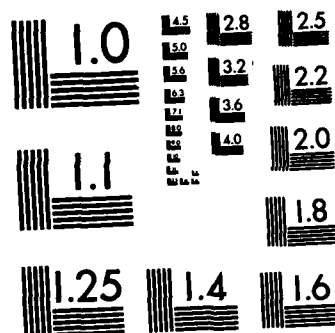
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STRESS AND CORONARY HEART DISEASE IN  
ORGANIZATIONAL, EXTRAORGANIZATIONAL,  
AND INDIVIDUAL ENVIRONMENTS

William H. Martin, Captain, USAF  
Loraine C. Simard, Captain, USAF

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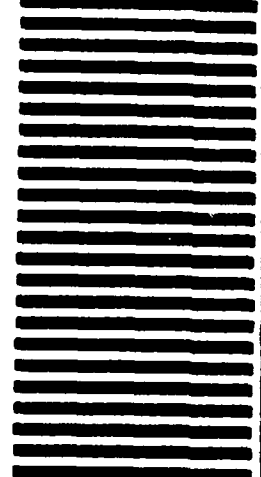
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→ Stress affects an individual both physiologically and psychologically. In this study, a random sample of 438 adult American workers were given a 160-item questionnaire to extract an individual's: 1) perceived stress; 2) perceived productivity; 3) response to different stressors; and 4) personality and physical traits. Blood tests were also given to extract an individual's cortisol, total serum cholesterol and HDL cholesterol levels. Statistical analysis was then completed to extract the relationships of the independent variables, stressors, and physical and personality traits to the dependent variables, perceived stress, perceived productivity, cortisol, and the ratio of cholesterol to HDL cholesterol. The study resulted in the hypothesis that every individual has a certain tolerance for change. This tolerance acts as a moderator in how an individual perceives a stressor (i.e., from little or no stress to highly stressful).

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STRESS AND CORONARY HEART DISEASE IN  
ORGANIZATIONAL, EXTRAORGANIZATIONAL,  
AND INDIVIDUAL ENVIRONMENTS

A Thesis

Presented to the Faculty of the School of Systems and Logistics  
of the Air Force Institute of Technology

Air University

In Partial Fulfillment of the Requirements for the  
Degree of Master of Science in Logistics Management

By

William H. Martin, BA  
Captain, USAF

Lorraine C. Simard, BA  
Captain, USAF

September 1982

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This thesis, written by

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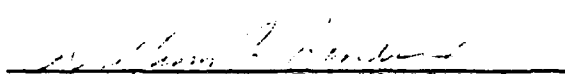
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## CHAPTER I

### LITERATURE REVIEW

#### Introduction

Coronary heart disease (CHD) is a major world problem. CHD accounts for 35 percent of the total deaths that occur in the United States alone (Gertler & White, 1976). Premature death from CHD affects more than 700,000 Americans each year. Ten percent of the male population will develop symptoms of CHD in their forties or fifties. The first symptom in over half of these cases will be a heart attack, and of these, over 50 percent will die (Dehart, 1978).

Epidemiologists track the beginnings of widespread heart disease in the United States to the early 1920's. Since then, mortality rates due to cardiovascular disease have increased dramatically. A majority of the deaths would have to be classed as premature, for they occur during an individual's most productive years, between 35 and 50 (Glass, 1977b).

#### Definition of Coronary Heart Disease

Coronary heart disease is a clinical disorder caused by lesions of the coronary arteries, a condition called atherosclerosis; a nontechnical term for it is hardening of the arteries (Glass, 1977a). There are two major manifestations of CHD: 1) angina pectoris, a disorder involving a type of

chest pain which arises when the heart muscle receives an insufficient supply of oxygen caused by the blockage of one or more of the coronary arteries; 2) myocardial infarction, commonly called a heart attack, caused by insufficient oxygen supply to the heart over a long period of time (Miles, 1976).

### Definition of Stress

Defining the term "stress" is difficult, primarily because there is no universally agreed-upon meaning among scientists. Some have used the term to describe the environmental characteristics thought to affect people adversely. It has also been used to mean the general bodily response to any demand (Beehr & Newman, 1978).

Stress, as used in this thesis, is the condition where factors interact with the individual to change his/her psychological or physiological condition such that the person is forced to deviate from normal functioning.

### Stress and Coronary Heart Disease

There is a popular theory among medical and psychological researchers that coronary heart disease is related to stress (Cox, 1978; Fye & Staton, 1981; Glass, 1977b; Matteson & Ivancevich, 1979). In fact, "few researchers reject the notion that stress is involved in the etiology (science of determining cause) of coronary heart disease" (Matteson & Ivancevich, 1979, p. 347).

Three general classes of stress have been studied in connection with CHD: 1) general dissatisfaction with various

aspects of life; 2) chronic or relatively long-term life events experienced by the individual as stressful; and 3) acute life events, defined by culture and the individual as stressful (Glass, 1977b).

Life's Dissatisfactions. Jenkins (1976) noted that studies from several countries agree that coronary patients report dissatisfaction in many areas of their lives. Sales and House (1971) found that occupational groups with higher job dissatisfaction had consistently higher mortality rates due to coronary disease. Glass (1977b) refers to research studies conducted in the Netherlands, Israel, Sweden, Finland, as well as in the United States, that aid in substantiating the theory that a general dissatisfaction with life highly correlates with CHD.

Chronic Stress. In 1958 Russek and Zohman conducted a study on 100 coronary patients between twenty-five and forty years of age. Of these, 89 had confirmed myocardial infarctions and eleven had suffered angina pectoris without infarctions. For comparison, 100 healthy subjects of similar age, occupation, and ethnic origin were studied. The most striking differences between the two groups were exhibited in the area of experienced stress. Prolonged chronic stress, usually associated with the pressures of job responsibility, preceded the attack in 91 percent of the coronary group (Cox, 1978).

Additional studies by Sales and House, French and Caplan, and others suggest that excessive work and responsibility, when approaching the limits of an individual's capacity to control,



precipitate CHD (Gertler & White, 1976; Sales & House, 1971; French & Caplan, 1972). Other studies consistently support the evidence that chronic stress, or its implications, play a significant role in the risk of CHD (Gertler & White, 1976).

Acute Stress. A study by Rahe, Romo, Bennet, Arthur and Siltanen (1973) examined the effect of recent life changes (acute stress) on coronary heart disease. Data on recent life changes were gathered on 279 survivors of myocardial infarction and 226 victims of sudden coronary death in Finland. Measurements of the victim's recent life changes were found out by nurse interviewers utilizing a translation of Holmes' Schedule of Recent Life Experience (SRE) questionnaire for the survivors, and by questioning the spouses and families of those who had died. The study determined that there was a significant increase in recent life changes for both the survivors of the myocardial infarctions and the coronary death subjects during the six months prior to infarction or death. This study substantiated previous studies by Rahe and Lind, Rahe and Pazzikivi, and Theorell and Rahe, conducted in 1971, but utilized a far larger sample size (over 500 persons) to provide greater reliability. The studies offer substantial evidence that acute stress is a precipitating factor in coronary heart disease (Glass, 1977b).

#### Physiological Linkings of Stress to CHD

One theory connecting stress to CHD, hypothesized by Raab, suggests that three different factors work on the

myocardial electrolyte balance which cause potentially fatal cell destruction: 1) coronary vascular insufficiency, which reduces oxygen supply to the heart muscle; 2) sympathetic-andrenomedullary activity, which increases oxygen demand; and 3) adrenocortical activity, which produces a change to the myocardial electrolyte balance. The first two factors together produce a myocardial hypoxia, which enhances the imbalance caused by the third factor (Cox, 1978).

The preceding hypothesis would explain the high risk factor of cholesterol and serum lipids in coronary heart disease. Continuous and prolonged stress is believed to increase cholesterol levels. The accumulation of cholesterol deposits causes arteries to harden and narrow as cholesterol builds up in the arterial walls, causing atherosclerosis. In time, the blood flow through the artery is restricted, reducing the amount of oxygen reaching the heart (Fumagalli, Ricci & Corini, eds., 1973).

Cholesterol. There have been many studies to confirm that cholesterol levels increase under stress. Probably the best of these was a field study performed at National Aeronautical and Space Administration (NASA) Headquarters by the Division of Occupational Medicine. NASA was selected because it was purported to have strong deadline and work overload pressures. In this study 22 white-collar males were observed at work for a period of two to three hours, on each of three days. Teams of two observers recorded and coordinated data on events occurring in the job environment and heart rate

responses to these events. The heart rates were obtained by a pocket-sized, telemetry device which did not restrict the employee's freedom of movement. On the days of the observations, blood samples were drawn and cholesterol determinations were made. The results of this study show a high correlation between perceived stress in the employees and increased levels of cholesterol (French & Caplan, 1972).

Further support for the association between cholesterol levels and stress comes from a study by Friedman, Rosenman, and Carroll (1957) on a group of tax accountants. This study was done by taking blood samples from the individuals twice a month for approximately six months, beginning at the first of the calendar year. As the tax deadlines approached, there were marked increases in the accountants' cholesterol level, assumed to be caused by the stress of having to complete the contracted tax forms. As the deadlines passed and the stress was reduced, cholesterol levels fell sharply.

Gertler and White (1976) stated that serum cholesterol is a major contributor to the overall risk rate for CHD. A serum cholesterol value of 200 mg per centiliter has a proportionate risk factor of less than three-tenths, in other words, less than three-tenths the risk for the average person. Raising the serum cholesterol level to 300 mg per centiliter increases the relative chance of CHD in an individual almost tenfold.

The previously mentioned study by Rahe, Bennet, Roma, Siltanen, and Arthur (1973) on the 500 Finnish CHD subjects also

substantiates the belief that cholesterol is a major risk factor in CHD. The study showed that 31 percent of the survivors and 51 percent of the coronary death subjects had substantially high levels of cholesterol at the time of infarction, over 259 mg per centiliter. The Air Force study by Rufus Dehart (1978) stated:

An elevated serum cholesterol level has had significant association with an increased risk for coronary heart disease. However, it has not proven that the amount of cholesterol in the diet is related either to the blood cholesterol level or the risk of developing heart disease. Furthermore, it has not been established that lowering the serum cholesterol by either modifying the diet or drug therapy is effective in reducing the incidence of CHD in those of high risk. (p. 1058)

Serum cholesterol is widely accepted as one of the more important factors in coronary heart disease, especially in atherosclerosis. However, there is also substantial evidence that high cholesterol levels alone are not the cause of the disease (Cox, 1978; Glass, 1977b). Drs. Gertler and White's study (1976) in Coronary Heart Disease revealed that:

(1) Serum cholesterol is of great value in predicting survival following an acute coronary episode. Those coronaries who subsequently died had a mean cholesterol value of 295 mg percent as opposed to 248 mg percent for the surviving coronaries. (2) Serum cholesterol was of limited value in predicting acute coronary heart episodes in the control group of this study. (p. 119)

In summary, it is generally accepted that stress gives rise to increased levels of cholesterol. Several studies substantiate this belief. It is also generally accepted that elevated levels of cholesterol are a severe risk factor in the incidence of CHD. However, the evidence that elevated cholesterol levels cause CHD is severely lacking. There are many

cases where lower levels of serum cholesterol were associated with CHD, especially in other countries such as India, Pakistan, Yugoslavia, and Israel (Gertler & White, 1976; Glass, 1977b). Cholesterol is normally associated with CHD through atherosclerosis. There have been reported cases of CHD in which there was no atherosclerosis, or when cholesterol levels are low to moderate.

Lipoproteins. In some cases, the cholesterol in the lesions of the coronary arteries is mainly present in large beta-lipoproteins, low density lipoproteins. These large lipoproteins have a high cholesterol to phospholipid ratio, which supposedly leads to increased lipid deposition in the arterial wall (Guyton, 1971). The cholesterol deposits accumulate, causing the arterial wall to thicken, constraining the flow of blood, thereby oxygen, to the heart. Indirect (correlative) evidence has suggested that there is an association between the elevation of serum lipids and the occurrence of atherosclerosis. It is suggested that the beta, or low density lipoproteins (LDL), rather than the alpha, or high density lipoproteins (HDL), are of greatest importance in atherosclerosis (Fumagalli, Ricci & Corini, eds., 1973). Kenneth W. Walton, Department of Experimental Pathology, University of Birmingham, England, has stated:

It is now coming to be widely agreed that the formulation of atherosclerotic lesions is associated with the movement of intact serum lipoproteins (rather than of simple lipoproteins in their free state) into the arterial wall at segregated areas of altered permeability. (Kritchevsky, Paoletti & Holmes, 1978, p. 145)

A hypothesis linking CHD to stress, proposed by Carruthers in 1969, theorizes that stress increases sympathetic andrenomedullary activity, which results in increased mobilization of free fatty acids (FFA) from the fatty tissues. In the absence of metabolic demand, the FFA are converted to triglycerides, or very low density lipoproteins (VLDL), and then available for incorporation into atheroma (Cox, 1978). The increased levels of LDL during stress would seem to collaborate this theory.

A series of studies by Gottschalk, Cleghorn, Gleser and Iacono (1965) strengthen this theory. In these studies several different relationships between different types of stress and blood lipids were disclosed in a group of 24 men. These findings were then cross-validated with a second study of 20 men. The results showed a significant positive correlation with stress and plasma-free fatty acids. There was also evidence of positive correlation between triglyceride levels and stress.

In contrast to elevated beta or LDL lipoprotein levels being a casual risk factor in CHD, HDL lipoproteins seem to be a risk-lowering factor. The inverse relationship between HDL and CHD was examined in the Cooperative Lipoprotein Phenotyping Study (CLPS). In this study 6859 men and women, over 40 years old, of black, Japanese and white ancestry, were examined in a control study. CHD prevalence was based on evidence of prior myocardial infarction or angina pectoris. The HDL-cholesterol was inversely correlated with levels of triglyceride, LDL-cholesterol and CHD. The greater rates of

CHD among the subjects with low HDL might have been due to higher triglyceride and LDL-cholesterol levels, but multivariate analysis indicated an inverse HDL-CHD association persisted after adjusting for the other lipids (Kritchevsky, Paoletti & Holmes, eds., 1978).

HDL might be involved in reducing risk of CHD by transporting cholesterol from the arterial walls to the liver for metabolism and on to the kidneys for excretion. Another possibility is that HDL may inhibit the intake of LDL into the arterial wall (Kritchevsky, Paoletti & Holmes, eds., 1978).

Dr. Raymond G. Troxler (1981), currently researching stress and CHD at the Medical Research Center, Brooks AFB, Texas, is examining the ratio of total cholesterol and HDL cholesterol. This ratio was developed as a part of the 20-year Framingham Study and was found to be the best predictor of potential for CHD. The higher the value resulting from the ratio, the greater the risk of CHD.

Cortisol. Lipoproteins and cholesterol appear to be related to stress through the increased secretion of cortisol. When a person becomes distressed, cortisol levels are nearly always increased. This, in turn, causes increased levels of cholesterol and serum lipids or, more specifically, the very low density lipoprotein triglyceride (Guyton, 1971). Guyton pointed out in Textbook of Medical Physiology:

It is amazing that almost any type of stress, whether it be physical or neurogenic, will cause an immediate and marked increase in corticotropin secretion, followed within minutes by greatly increased adrenocortical secretion of cortisol. (p. 893)

A study by the United States Navy on underwater demolition team training illustrates the relationship of stress to increased cortisol. In this study repeated determinations of serum uric acid, cholesterol and cortisol levels were done three times a week during a 16-week underwater demolition training course, a period of considerable physical and psychological stress. This study concluded that cortisol levels increased in subjects under stress (Rubin et al., 1970).

There were two more studies, one by Brown, Schalc, and Reichlin dealing with squirrel monkeys, and one by Kopin dealing with hospital inpatients, that substantiate the Navy study (Fye & Staton, 1981). However, another study by Caplan, Cobb, and French (1979) indicated that chronic stress lowered the cortisol level. There is the possibility that the difference between the first three studies and the last one is the type of stress. Acute stress (short-term) is believed to increase cortisol levels, while chronic (long-term) stress may decrease cortisol output by exhausting the adrenal output capacity (Caplan, Cobb & French, 1979; Fye & Staton, 1981).

A study by Troxler, Albanese, Sprague, Fuchs, and Thompson (1977) shows the relationship of stress to cortisol, and cortisol to cholesterol and LDL-lipoproteins. In this study plasma cortisol was compared to major risk factors for coronary artery disease. This study demonstrated the highest degree of correlation between cortisol and cholesterol. Statistically significant correlations were also found between cortisol and triglycerides.



In summary, based on the studies and evidence presented, it is proposed that:

1. Perceived stress by an individual is a risk factor in CHD.
2. Personality acts as a moderating variable between the individual and his/her perceived stress, affecting his/her susceptibility to CHD.
3. Perceived stress has physiological effects that act as precipitating agents for CHD.

The paper pointed out two possible hypotheses--Carruthers' and Raab's linking stress to CHD through physiological actions of the body. These two hypotheses are not alternatives, but either can possibly cause CHD alone or through interrelated processes (Cox, 1978). Stress appears to affect many physiological components that relate to the two hypotheses. This paper discussed only three: cortisol, serum lipids, and cholesterol. All of these items showed positive correlations with CHD, and in some aspects with each other. The different physiological components may be both direct and indirect in their relationship to CHD. However, their overall result is mainly affected by what the individual perceives as stressful.

Briefly stated, overwhelming evidence exists for linking stress to CHD. However, there is evidence that the effects of stress are moderated by certain psychological personalities. It is essential to note that individual differences, the elusive human element that takes the exactness out of social

science, plays an important role in determining why one person's stress-inducing situation does not necessarily cause stress in another. Because of the inconsistencies in how individuals perceive stress, researchers are also examining behavioral patterns to determine the relationships of stress to coronary heart disease (French & Caplan, 1972).

### Individual Factors

The marked increase in CHD during the twentieth century in the United States, as well as many other Western, industrialized societies, cannot be attributed to better diagnostic methods, an older population, or genetic changes. There is now much evidence supporting several causes to this epidemic. Blood pressure, elevated serum cholesterol, hypertension, obesity, and cigarette smoking are the stress-enhanced, biological risk factors found to be strongly associated with CHD risk (Jenkins & Zyzanski, 1980; Glass, 1977a; Chesney & Rosenman, 1982). However, these factors, even when considered with the individual's diet, body weight, amount of exercise, and family history, explain less than one half of the CHD associated variance in all prospective studies (Chesney & Rosenman, 1982; Jenkins & Zyzanski, 1980).

Coronary-Prone Behavior Pattern - Type A. The search for additional causes led to the recognition of a set of observable behavior characteristics of CHD patients, known as the Type A coronary-prone behavior pattern. The Type A behavior pattern was originally determined by a structured

interview. Jenkins, Rosenman, and Friedman (1967) later developed a self-reporting questionnaire, the Jenkins Activity Survey (JAS), to assess Type A. Type A behavior is not considered to be a personality description. It is a characteristic style of responding to and coping with environmental stressors (Jenkins & Zyzanski, 1980; Chesney & Rosenman, 1982). Several examples of Type A behavior, as characterized by Friedman and Rosenman in 1974, include: ambitiousness, aggressiveness, competitiveness, impatience, tenseness, alertness, vigorous speech production, and time urgency during activities (Goldband, 1980). Individuals who have this behavior pattern often concentrate so much on their jobs that other areas of their lives are neglected. The converse of Type A, Type B, does not exhibit Type A behavior responses, and is not believed to be coronary prone. Type B individuals tend to be more introverted, relaxed, deferent and patient. Because they are more unhurried than Type A individuals, they rarely get caught up in any race against time.

The Type A pattern has, in many studies, been linked to "an increased relative risk of CHD in the order of 2 to 1" (Jenkins & Zyzanski, 1980, p. 172). In fact, regardless of different Type A measurement approaches, positive findings over many nations are consistently found. A review panel of 50 eminent scientists, assembled by the National Heart, Lung and Blood Institute, critically examined and accepted the body of scientific evidence concerning the increased CHD risk due to Type A behavior (Chesney & Rosenman, 1982).

This risk is greater than that imposed by age, elevated values of systolic blood pressure and serum cholesterol, and smoking and appears to be of the same order of magnitude as the relative risk associated with the latter three of these factors. (Chesney & Rosenman, 1982, p. 14)

Disturbing Emotions. An individual's sustained, intense, disturbing emotions are also considered risk factors for CHD (Jenkins & Zyzanski, 1980). Studies relate emotional factors, such as anxiety, depression and neuroticism, to the presence of angina pectoris (AP) and myocardial infarction (MI). One of these studies, performed by Zyzanski, Jenkins, Ryan, Flessas, and Everist (1976), found that intense, disturbing emotions, such as anxiety, depression and neuroticism, are not merely related to the intensity of complaining about heart symptoms, they are also associated with the atherosclerotic process. The researchers tested male patients undergoing coronary angiography. This procedure visualizes the amount of atherosclerotic deposits, as well as other anomalies, in coronary arteries through x-rays. Anxiety and depression scale scores related to the amount of vessel obstruction observed by angiography. This family of variables, the intense disturbing emotions, represents how an individual's internal responses interact with environmental stressors.

Another study (van Doornen, 1980) confirmed that 78 high-risk 'healthy' controls (which were classified as either 'high-risk' or 'low risk' on blood pressure, serum cholesterol, and/or smoking) showed a psychological resemblance to MI patients. The coronary disease-prone Type A behavior pattern

had two major clusters: the usual Type A pattern (impatience, overactivity and ambition), and a new combination of neuroticism and depression. In this case, depression is the helplessness demonstrated by the Type A individual after overreacting to control his/her environment, thereby experiencing chronic frustration. The researcher hypothesizes that the combination of the two clusters in one individual could, in effect, be the risk-enhancer. This would join the two lines of research in the Coronary Risk Personality field--the one dealing with traditional psychological concepts, the other specializing in the Type A pattern.

Locus of Control. Locus of control is a term for the concept of internal-external control of reinforcement, developed by Rotter in 1966. It covers the degree to which an individual believes that reinforcements depend upon his/her own behavior (Anderson, 1977). Internal Locus of Control-type people believe they control their own lives and their behavior, capacities and attributes provide the necessary reinforcements. External Locus of Control-type people believe their reinforcements do not come from within themselves. Luck, other powerful people, fate and chance determine the direction of their lives. Therefore, a person's view of reinforcement will already have been shaped by past experiences.

Interest has been increasing for more information on the relationship between locus of control and a manager's performance. A recent literature review conducted by Joe (1971) indicates that externals are more aggressive, dogmatic,

anxious and suspicious of other people than internals. External types have low needs for social approval, lack self confidence and insight, and tend to use sensitizing modes of defense. They are anxious, less able to show constructive responses in dealing with frustrations or stress, and are more concerned with the fear of failing than with achievement. Internals, on the other hand, demonstrate more initiative in reaching their goals and to control their environments. Joe ends his comprehensive literature search by stating that:

While findings are not remarkably consistent, generally, data tend to support Rotter's contention that the internal-external control concept is a generalized expectancy operating across many situations. (p. 634)

Assertiveness. Assertiveness is that character trait whereby an individual outwardly responds to various confrontations in an appropriate, positive, self-confident manner. Initial research by Lieutenant Colonel Raymond G. Troxler, MD, indicates that individuals with a high degree of assertiveness tend to cope better with stressful situations than do individuals with a low degree of assertiveness (Fye & Staton, 1981). He attributes this to the fact that an assertive person will respond immediately to various stressors and not allow them to "accumulate" and possibly build up to such a degree as to cause him/her psychological and/or physiological harm.

Troxler's study examined the relationship between assertiveness and stress (Fye & Staton, 1981). It involved a small sample of approximately 40 Department of Defense secretaries working in the San Antonio, Texas area. Cortisol levels

were used as an indicator of stress, and questionnaires measured assertiveness. Secretaries who were more assertive had reduced levels of cortisol. Therefore, assertiveness could be a moderating variable in relation to stress.

Later research conducted by Fye and Staton (1981) used a sample of 203 healthy career people, primarily USAF personnel. They measured the relationship of assertiveness to perceived stress by administering a questionnaire. Assertiveness was found to be significant at the .1 tolerance level to external stress. This demonstrates that individuals with more assertiveness have lower perceived stress levels.

In summary, early research efforts have found a negative relationship between perceived stress and assertiveness.

#### Extraorganizational Factors

In the past, organizational theorists have concentrated their studies on work and its possible resulting dissatisfactions in their quest for understanding stress and its effects. However, researchers have now begun to notice factors outside the work environment itself that greatly enhance work stress as well as stress in general.

Social Forces. A research group at the University of Pennsylvania has roughly quantified the relative contribution of various causal factors to excess mortality (Eyer, 1980) by combining the results of studies with cross-national and time series analyses of death rates. They have found that "CHD appears as the major cause of the general excess mortality

which emerges with the growth of modern society" (p. 75). They have also found broad social forces to be its main causal factors. The primary forces are overwork and various kinds of social disruption. These are the central points of the typical social transformation which results from modern economic growth (capitalism). Social stress appears to act first in young adulthood, affects many different causes of death over time and age, and seems to have chronic as well as immediate pathogenic effects. The four major sources of pathogenic stress involved in modernization are community-disrupting migration, marriage delay and disintegration, labor market unemployment, and overwork. These major sources of social stress rise dramatically on a population basis with modern development. Alcohol consumption per capita, moderately strongly correlated with the four sources of stress, also rises with modernization. It is reasonable to see increased use of alcohol as one way, among many, of coping with the stress of modern-day living.

Life Events. Naturally occurring stressful experiences in an individual's life have consistently been linked in the development of psychiatric and somatic disorders (Redfield & Stone, 1979). In order to understand the nature and effects of stressful events, Holmes and Rahe developed the Social Readjustment Rating Scale in 1967. This scale is based on a large sample's average rating of the amount of social readjustment an average person would experience when an event would occur. Social readjustment, as it is used here, is the degree



and duration of an individual's adaptation to a life event regardless of the event's desirability (e.g., marriage, death of a spouse, jail term). The Holmes and Rahe scale has become a popular means for indexing levels of stress in studies relating social factors to stress and coronary heart disease.

The idea that change is a main component of stressful experience is common to many conceptions of stress. However, Redfield and Stone (1979) believe that equating life change with stress may be oversimplifying the characteristics of normally complex stressful events. As a result, they conducted a study to determine just how much individuals differed in rating life events on one or more qualitative dimensions. The most important result was finding that an individual's ratings of events on qualitative dimensions were characterized by interactional processes. Individuals not only differed in mean ratings of event classes on single dimensions, their pattern of mean ratings across scales differed considerably also. Redfield and Stone concluded that it may be as important to understand which characteristics of individuals determine responses to stressful life events as it is to understand the event qualities themselves.

Another recent study (Weinberg & Richardson, 1981) examined what was stressful about an event and for whom. Weinberg and Richardson used the birth of a child as the major stressful life event because it encompasses a range of experiences over time. Parents must learn to care for the child as well as reorganize their ongoing life structure regarding simple life

maintenance, social contacts, and job stress. The study agreed with Lazarus' conceptualizations of stress arguments that stress events identified on a sociological level of analysis will differ in meaning to different individuals according to their own characteristics and social milieu. Results indicated that spouses normally did not share common perceptions of stress. They also demonstrated how mothers who worked outside the home and mothers who are home with their children had different views on the importance of the various areas of parenting stress. Working mothers were especially stressed by how little time they had left for themselves and their own activities. This was due to the large proportion of total time they had to allot to both mothering and working an outside job or career.

Family Relationships. Type A individuals, wanting to succeed, normally work long, hard hours under deadline pressures and conditions of overload. They often carry work home with them and show an inability to relax. Vacations, if taken at all, are short in order for them to get back to work. Competition with themselves and others is fierce. They constantly set high standards of productivity that they seem driven to maintain. All this creates a stressful environment for the Type A individual. Their life-style seriously constrains the energy, time and attention they can devote to things outside work. As a result, their family system also experiences stress.

The study conducted by Burks, Weir and DuWors (1979) explored the reported marital satisfaction and well-being of the spouses of 85 top-level administrators of correctional

institutions with Type A behavior. The findings indicated that there was a relationship between the individuals with higher Type A levels of behavior and their spouses' reports of less marital satisfaction. The individual's work also has a great impact on home and family life. Spouses of Type A individuals had significantly fewer friends, fewer social contacts, and did not have a strong sense of belonging to a social network from which they could have drawn psychological support. In comparison to the individuals exhibiting less Type A behavior, the higher Type A spouses perceived that either their own partners or their neighbors were not as good sources of support.

In summary, there was a relationship between an individual's behavioral predisposition to act in a Type A manner and certain of his/her spouse's life experiences. These preliminary findings demonstrate that the hard-driving and productive individuals, who society often holds up as models of success.

may not only be exposing themselves to the probability of a shorter life but also may be adversely affecting those individuals whose day-to-day lives are intimately linked to theirs. (Burke, Weir & DuWors, 1979, p. 63)

### Organizational Factors

Large business organizations exert unique forces on the individuals working for it (French & Caplan, 1972). By applying these forces, the organization is able to channel the individual's behavior toward certain goals. The organization, in return for the individual's conformity, not only incurs direct costs in the form of individual compensation, it also incurs indirect costs, manifested in the form of job-related

pathologies. "These pathologies can manifest themselves in forms ranging anywhere from passive apathy, job dissatisfaction, and depression, to violent acts directed against the organization" (French & Caplan, 1972, p. 307). In some cases cost exhibit themselves in the form of illnesses in the individual, incapacitating the employees, thereby forcing them out of the organization before their full potential has been realized.

Evidence in the physical and psychological sciences shows that the influence of stress in organizations may be reaching epidemic proportions. "Among the diseases of symptoms most frequently related to stress in organizations are peptic ulcers, cardiovascular disorders, and high blood pressure" (Schuler, 1980, p. 185). It is estimated that the economic cost of cardiovascular disease and ulcers alone in the United States is about \$45 billion annually (Schuler, 1980). Therefore, it comes as no surprise that organizational stress is becoming an increasingly important concern, both academically and organizationally.

Organizational stress encompasses both job stress and role stress. Role stress is commonly broken down into components such as role ambiguity, role conflict, and role overload. Job stress components usually include workload, job responsibility and job satisfaction.

Role Stress. Research on role theory has focused on role stress as a factor that influences effective and behavioral role responses. "Role stress results from conflicting, incompatible, or unclear expectations that are derived from

the work environment" (Abdel-Halim, 1978, p. 561).

Role ambiguity reflects a situation where there is a lack of information, while role conflict reflects a situation where the information arouses conflict (French & Caplan, 1972). Previous research by Gross, Mason and McEachern; House and Rizzo, Ivancevich and Donnelly; Kahn, Wolfe, Quinn, Snoek and Rosenthal; Lyons; and Organ and Greene has demonstrated that both role ambiguity and role conflict are adversely related to a host of work-related outcomes (Latack, 1981; Moch, Bartunek & Brass, 1979; Schuler, 1977; Miles, 1976; Sales, 1969). However, only one of the studies, Kahn's, included an attempt to distinguish role perceptions on the basis of differences in role requirements.

Across these studies, the degree of role conflict and role ambiguity is directly related to job-induced stress and inversely related to job satisfaction and positive attitudes toward role senders (Miles, 1976). Role stress, such as ambiguous and/or conflicting expectations, or feelings that role expectations are unfair, has also been shown to be associated with a variety of dysfunctional consequences: low performance and satisfaction; high anxiety and tension; and an inclination to leave the organization (Moch, Bartunek & Brass, 1979). These studies have tended to focus on the characteristics of role receivers or on contextual variables, such as task characteristics and structure, that affect role receivers. Moch, Bartunek and Brass attempted to document the impact of task characteristics and structural attributes reported by role

senders on stress experienced by role receivers. Their findings indicate that "the context in which role senders perform their organizational tasks has a substantial effect upon role stress experienced by role receivers" (p. 267).

Parkington and Schneider (1979) found a causal relationship between service orientation discrepancy, role stress and employee outcomes. Bank customers and employees from 23 branches of a large bank responded to questionnaires for assessing employee perceptions of management's orientation to service and the employees' own orientation to service. The results suggest there is a strongly related discrepancy in the way employees experience their workload. The larger the discrepancy, the more the employees experience role conflict and ambiguity. The role stress perceptions and service orientation are related to organizational dissatisfaction, frustration, intentions to find other means of employment, and feelings that customers were receiving a low quality service. Positive employee outcomes related significantly to positive customer attitudes regarding the quality of service received.

Schuler (1977) and Woodward both report that the appropriateness of an organization's structure is determined by its interactions with technology. Mechanistic structures are more appropriate with less complex technology, while organic structures normally perform better with more complex technology. "Role conflict and ambiguity may not be so much the result of organizational structure per se, but its appropriateness with the organization's technology" (Schuler, 1977, p. 67).

Miles (1976) examined relationships between major role requirements and experienced role stress on the basis of data drawn from 202 research and development professionals. Measures of role stress included various types of role ambiguity and conflict. Role requirements included integration and boundary-spanning activities and personnel supervision. Role conflict appeared to be more sensitive to differences than role ambiguity in research and development role requirements. The best predictors of experienced role conflict were the integration and boundary-spanning activities. These results can be used in the hypothesis that role underload represents a constraint, while role overload represents a demand. Qualitative overload is more stressful than quantitative overload, because it involves people (Schuler, 1980; Quick, 1979).

Role overload is a condition in which the individual is faced with a set of obligations which, taken as a set, requires him/her to do more than he/she is able in the time available (Sales, 1969). Levi states that role overload and underload appear to be directly associated with an individual's need for stimulation (Schuler, 1980). Situations of overload are associated with too much stimulation and situations of underload are associated with too little stimulation. According to French, Frankenhaeuser and Gardell, either situation is associated with high stress, although qualitative overload (such as being responsible for people rather than things) may be the more stressful of the two, as pointed out by Wardwell, Hyman and Bahnson; Pincherle; French and Caplan (Schuler, 1980).

Sales (1969) designed a laboratory study which involved simulations of role overload and role underload as they might appear in ongoing organizations. He concluded that overloaded roles can exert a marked deleterious effect upon the health of individuals. Findings also suggested that organizational roles, whether overloaded or not, cause the most stress upon the organizational members who experience the lowest job satisfaction.

Adbel-Halim (1978) examined the relative importance of all three role variables--role conflict, ambiguity, and overload--as sources of stress. The results of his study "point out the importance of job enrichment characteristics as moderators of employee affective responses to different role stressors" (p. 576).

In conclusion, previous research has not looked beyond the "general" role stress variables to discover the specific nature and sources of role ambiguity, conflict, and overload in complex organizations (Miles, 1976). Research also needs to be done on relating experienced role stress to different role requirements existing within the same organization. Until effort is made to close these gaps, the diagnosis of role stress is likely to be of little value in understanding employee strain and in designing mechanisms (e.g., selection and placement, job/role design, supervisory training, etc.) to manage its consequences for individuals and organizations (Latack, 1981; Miles, 1976).

Job Stress. Margolis and Kroes define job stress as



a condition at work interacting with worker characteristics to disrupt psychological or physiological homeostasis (Beehr & Newman, 1978). The causal situational conditions are job stressors, and the disrupted homeostasis is job-related strain.

"The responsibilities a person has constitutes another frequent stress in organizations" (French & Caplan, 1972, p. 322). French and Caplan have categorized responsibilities into two types: responsibilities for persons and responsibilities for things. Responsibility for persons involves their work, their careers and professional development, and their job security. Responsibility for things involves budgets, projects, and equipment and other property. In their Goddard Space Flight Center study, French and Caplan (1972) found that responsibilities for persons increase as managers move up the status ladder. Responsibility for things also increases, but the relationship between organizational status and impersonal responsibilities is not as pronounced. Thus, "an increase in status is more likely to mean an increase in responsibilities for persons than in responsibilities for things" (p. 323).

Managers who spend large amounts of time interacting with people are also under great deadline pressure, sometimes just barely keeping up with their schedules. This example of stress is known as quantitative overload (French & Caplan, 1972). The workload of an individual is too great for the amount of time he/she has. This issue only concerns the sum total of work that must be done, irrespective of its difficulty. Qualitative overload is when the employee's workload

is overwhelming because of his/her lack of experience, skill or knowledge (French & Caplan, 1972).

French and Caplan measured quantitative overload in a variety of ways. Their questionnaires in the Goddard study contained items on "overwhelming workload," "not enough time," "the quantity of work you are expected to do," and others. Other measures included the observation of the number of hours the individual worked and the frequency and severity of his/her deadlines. All the measures proved to be good indicators of quantitative workload and showed similar effects of overload on strain. In order to prove more conclusively that the stress of workload produces physiological strain, they conducted two controlled laboratory experiments. The experiments proved that "qualitative and quantitative work overload are the causes rather than the effects of physiological as well as psychological strains. When overload is reduced, the strain decreases" (p. 319).

In another study Caplan, Cobb and French (1975) investigated the relationships between job stress, social support, personality, and cigarette smoking quit rate. They used multivariate analysis of questionnaire responses of 200 male administrators, engineers, and scientists. The results indicated that quitters had the lowest levels of quantitative workload and responsibility. The quitters also scored low on Type A personality characteristics (i.e., they were not hard driving, persistent, competitive, overloaded with work, or involved with work).

In general, persons who had been unable to quit smoking, compared to those who had quit, appeared to have more job stress in terms of quantitative workload, deadlines, and responsibility, especially for the careers, well being, and work of others. (p. 216)

Job satisfaction is often thought to be a function of the relationships between what an individual wants from a job and what the job is perceived as offering or requiring (O'Reilly & Roberts, 1975). Recent research by Herman, Dunham, Porter and Lawler has demonstrated that effective responses to work are related more directly to the structural characteristics of the organization than to individual differences. Individual characteristics, however, have been thought to be antecedent to job satisfaction by Campbell, Dunnette, Lawler, and Weick; Pallone, Hurley, Richard, and Vroom, but relevant empirical evidence supporting this notion has not been accumulated (O'Reilly & Roberts, 1975).

O'Reilly and Roberts (1975) examined the relationships among 13 individual traits, 3 structural characteristics of the position, and 5 aspects of job satisfaction. They first used partial correlations to control for the effects of the structural characteristics. They then computed canonical correlations to assess relationships among personality variables and job satisfaction. No significant relationships were found. Canonical correlations between structural characteristics and job satisfaction with personality traits partialled out were significant. The results were validated by randomly splitting the sample and recomputing the analysis. The general hypothesis that individual work-related traits affect

satisfaction was supported only insofar as intrinsic traits may predict attainment of position. Structural characteristics appear to be more directly linked to job attitudes than personality traits.

McClellan (1976) was concerned with the reactions to aspects of work that are often dealt with. These include stressors that cause some degree of physical or emotional disability in the vulnerable individual. These specific stressors make coping difficult or impossible and hinder adjustment on and off the job.

The sample consisted of 865 employees at three levels of management in one company. They completed a confidential questionnaire on their job satisfaction, their perception of task stress and the extent of specific physical and emotional disabilities. He found a relationship between anxiety and an individual's perception of job stress, job satisfaction and health problems. As an employee's anxiety decreased, job stress and health problems also decreased while job satisfaction increased. The reverse was true when employee anxiety increased.

Ivancevich (1974) examined the effects of the four-day, 40-hour workweek by comparing 104 experimental and 106 control subjects on measures of job satisfaction, anxiety-stress, and performance over a 13-month period. His analysis indicated that the workers in the four-day, 40-hour division were more satisfied with personal worth, social affiliation, job security, and pay. They experienced less anxiety-stress and performed

better with regard to productivity than their control group (five-day, 40-hour) counterparts.

Ivancevich (1975) also studied the relationship of types of formal structure to job satisfaction, anxiety-stress, and performance. His research found that trade salesmen in flat organizations: 1) perceived more self-actualization and autonomy satisfaction; 2) reported significantly lower amounts of anxiety-stress; and 3) performed more efficiently than salesmen in medium and tall organizations.

Schneider and Snyder (1975) investigated relationships among two measures of job satisfaction, one measure of organizational climate, and seven production and turnover indices of organizational effectiveness in 50 life insurance agencies. Their research showed that: 1) climate and satisfaction measures are correlated for people in some positions in the agencies, but not for others; 2) people agree more on the climate of their agency than they do on their satisfaction; 3) neither satisfaction nor climate are strongly correlated with production data; and 4) satisfaction, but not climate, is correlated with turnover data.

Obviously, a person's job is not the only source of stress in his/her life. Also, job stress is not something that can be left at the office when a person goes home. Therefore, the management of job stress cannot be confined solely to the job situation. The physical and/or psychological strain goes with the individual and can be affected by his/her physical and social-psychological environment off the job as well

on (Newman & Beehr, 1979). Research on strategies for handling job stress needs to come to grips with this open-system characteristic of people. In other words, "since stress phenomena have open system characteristics, strategies for handling job stress need to be systematic in nature" (Newman & Beehr, 1979, p. 39).

### Conclusion

This review suggests that valid, generalizable recommendations regarding strategies for handling stress currently are unattainable. Some of the major research problems in this area are: 1) confusion in the use of terminology regarding the elements of stress; 2) relatively weak methodologies within specific studies, the lack of systematic approaches in the research; 3) the lack of interdisciplinary approaches; and 4) the lack of attention to many specific facet elements (Beehr & Newman, 1978).

Further research in stress management should be in terms of multiple causation and multiple effects (Newman & Beehr, 1979). Researchers must deal with the possibility that stressors, strains, and adaptive responses likely have multiple causes and multiple effects (i.e., systems effects --it is virtually impossible to make a single change in an open system). This implies that future research needs to be multivariate and longitudinal in nature. For example, it should allow for the measurement of the immediate, short-term, and long-term causes and effects of stress management

strategies (Newman & Beehr, 1979).

On the subject of new research, Dr. Troxler (1981) has proposed that the amount of enjoyment obtained from an aspect of life (i.e., family, friends, job, or hobbies) in respect to the amount of time spent doing it has a direct relationship to stress. He developed certain ratios for the percentage of an individual's enjoyment of certain activities, divided by the percentage of time spent in the pursuit of them. His contention is that there is a negative relationship between the ratio of the enjoyment obtained by an aspect of life and the time spent in the performance of that aspect with perceived stress.

Finally, as Kahn and Quinn pointed out in 1970, there appears to be no single recipe or point of intervention to be recommended for the management of stress in all individuals in all organizations in all circumstances.

### Research Questions

It is generally accepted that a relationship exists between stress and coronary heart disease and that excessive stress has a detrimental effect on organizations. This research effort was designed to answer the research questions listed below:

1. What organizational, extraorganizational, and individual facets are predictive of perceived overall stress?
2. What organizational, extraorganizational, and individual facets are predictive of perceived organizational stress?

3. What organizational, extraorganizational, and individual facets are predictive of perceived external stress?

4. Is there a relationship between perceived external stress and perceived organizational stress?

5. What organizational, extraorganizational, and individual facets are predictive of physical stress (i.e., cortisol levels)?

6. What organizational, extraorganizational, and individual facets are predictive of the CHD potential (i.e., the ratio between total serum cholesterol and HDL cholesterol)?

7. What organizational, extraorganizational, and individual facets are predictive of perceived productivity?

8. Are diagnosed CHD, blood pressure problems, ulcers, or frequent headaches related to perceived overall stress?

9. Are diagnosed CHD, blood pressure problems, ulcers, or frequent headaches related to perceived organizational stress?

10. Are diagnosed CHD, blood pressure problems, ulcers, or frequent headaches related to perceived external stress?

11. Are any of the enjoyment versus time ratios, as conceived by Dr. Troxler (1981), for family, friends, job, or hobbies predictive of perceived overall stress?

12. Are any of the enjoyment versus time ratios for family, friends, job, or hobbies predictive of perceived organizational stress?

13. Are any of the enjoyment versus time ratios for family, friends, job, or hobbies predictive of perceived



external stress?

14. Are any of the enjoyment versus time ratios for family, friends, job, or hobbies predictive of physical stress (i.e., cortisol levels)?

15. Are any of the enjoyment versus time ratios for family, friends, job, or hobbies predictive of coronary heart disease (i.e., the ratio of total cholesterol to serum cholesterol)?

16. Are any of the enjoyment versus time ratios for family, friends, job, or hobbies predictive of perceived productivity?

## CHAPTER II

### METHODOLOGY

This research team examined the relationships between job environmental factors, selected individual traits, and various facets outside the job environment with perceived stress, perceived productivity, and certain physiological components of the human body.

Job environment facets, individual traits, extraorganizational facets, perceived productivity, and perceived stress were measured by a questionnaire referred to as the Stress Assessment Package II (SAP II). The physiological components, which included cortisol and the ratio between total cholesterol and HDL cholesterol, were measured through blood analysis by the USAF School of Aerospace Medicine (USAFSMA/NPG), Brooks AFB, Texas.

The relationships between independent variables (job environment, individual traits, and extraorganizational facets) and dependent variables (perceived stress, perceived productivity, and the physiological components) were examined utilizing the computerized multivariate analysis techniques of the Statistical Package for the Social Sciences (Nie & others, 1975).

Specific details concerning questionnaire development, blood analysis, questionnaire administration and statistical analysis are discussed in the following section.

### Questionnaire Development

The Stress Assessment Package II is a 160-item questionnaire designed to measure five major categories: 1) job environmental facets; 2) extraorganizational facets; 3) perceived productivity; 4) certain individual character traits; and 5) perceived stress. It is divided into thirteen sections which are designed to fit into these five categories, with two of the thirteen sections further subdivided into two different parts. The entire questionnaire is included in Appendix A, with the mean response to each question. Appendix B contains a listing of facets by category. The specific breakdown of the major categories is as follows.

Category 1 - Job Environment Facets. Measurement for Job Environment Facets were taken primarily from the Stress Assessment Package (SAP I), developed through the research efforts of Fye and Staton (1981). Twenty-eight of their questions were eliminated due to insignificance and replaced by new questions abstracted from the Organizational Assessment Package developed by Hendrix and Halverson (1979) for the USAF Management Development Center. New questions were also developed to look at certain specific areas. Table 1 is a complete breakdown of the Job Environment Category by section.

Section 4 - Job Inventory -- There were thirty questions for measuring Job Inventory. Factor analysis broke these down into seven primary facets: job autonomy, job suitability, job enrichment, goal participation, job significance, job conflict, and job clarity. The most significant questions were kept

TABLE 1  
Job Environmental Facets

Section	Number of Questions
4 - Job Inventory	30
5 - Supervisory Inventory	15
6 - Organizational Climate	17
7 - Job Satisfaction	7
13 - Background Information	<u>10</u>
Total	79

from SAP I. New questions were developed by this thesis team, under the guidance of Lieutenant Colonel William H. Hendrix, PhD, Industrial Organizational Behavior, to replace those that were eliminated.

Section 5 - Supervisory Inventory -- The questionnaire utilizes 15 questions to measure the participant's assessments of various aspects of his/her work group's supervision and the participant's relationship to his/her immediate supervisor. Nine questions were utilized to measure supervisor/participant relations. Two questions were developed to measure supervisor feedback. Four questions were constructed to measure supervisory control and supervisory practices.

Section 6 - Organizational Climate -- SAP II contains 17 questions to determine the participant's assessment of his/her general organizational climate. These questions were used to ascertain four general facets of the organization: 1) the organization's concern for employees; 2) the employee's conception of job importance; 3) policy and rules of the

organization; and 4) the organizational harmony.

Section 7 - Job Satisfaction -- The questionnaire measured the degree of satisfaction the participants received from seven different aspects of their jobs. Six of these seven were selected on the basis of significance from the ten questions utilized by Fye and Staton. The seventh, progression opportunities, was developed by this thesis team to examine the hypothesis that failure to progress in one's job/career adds to stress.

Section 13 - Background Information -- SAP II used ten questions in this area to measure five more facets of Job Environment: total time with organization; experience in job; number of people supervised; whether or not the supervisor wrote the employee's performance evaluations; and stability of job (i.e., hours, shifts, and location).

Category 2 - Extraorganizational Environment. These questions were constructed in order to measure the effect of certain items outside the job environment that contribute to an individual's perceived stress. Specific breakdown by section is shown in Table 2.

TABLE 2  
Extraorganizational Environment Facets

Section	Number of Questions
9 - Social Environment Inventory	8
10 - Perceived Stress	1
11 - Family Inventory	<u>5</u>
Total	14

Section 9 - Social Environment Inventory -- SAP II used eight different questions to measure three separate facets of the social environment. Four questions were used to measure the participant's assessment of his/her social acceptance. Two questions measured outside interests and two measured conflict between social and professional commitments.

Section 10 - Perceived Stress -- One question from this section was used to measure the individual's conception of how he/she is accepted socially away from the job versus his/her desire for that social acceptance.

Section 11 - Family Inventory -- SAP II used five questions to assess the participant's perception of his/her family life. These questions were developed in order to test the hypothesis that an unhappy home life adds to a person's stress and reduces productivity.

Category 3 - Personal Environment. The Personal Environment category was designed to measure a wide variety of facets, covering everything from certain personal character traits to what the individual eats for breakfast. As in the case with Job Environment questions, many of the Personal Environment questions came from the SAP I questionnaire. Insignificant ones were eliminated or modified. In addition, new questions were invented by modifying the format of several of the original questions in order to develop a new scale for certain Locus of Control and Type A/B questions. Breakdown by questionnaire section for Category 3 is shown in Table 3.

TABLE 3  
Personal Environment

Section	Number of Questions
1 - Personal Beliefs	9
Part II	5
2 - Personal Attributes	6
Part II	9
8 - Assertiveness	5
10 - Perceived Stress	5
12 - Food Consumptive Inventory	5
13 - Background Information	15
Total	<hr/> 59

Section 1 - Personal Beliefs -- These questions were designed primarily to determine to what extent a participant was either an internal or an external locus of control type individual. For the first nine questions, the scale was based on Rotter's 29-item questionnaire Internal/External (I/E) scale, as modified by Valencha (1972) to an 11-item scale. Valencha's modified scale was used with changes from four gradients of I/E locus of control to six gradients by Fye and Staton. This research effort selected Fye and Staton's most significant items, reducing Valencha's eleven questions to nine. Part II was used to modify the gradient to conform to the questionnaire norm and to compare with Part I as an alternative for future research efforts.

Section 2 - Personal Attributes -- SAP II utilized 15 questions to measure the Type A or Type B tendency of the participants. The six questions from Part I were those found

most significant by the Fye and Staton research effort. The other nine questions were developed by this research team in hopes of measuring the same items as the first six with a modified scale.

Section 8 - Assertiveness Inventory -- The assertiveness scale was developed by selecting only those that were found significant of the seven used by Fye and Staton in SAP I.

Section 10 - Perceived Stress -- Five questions from this section were used to measure an individual's tolerance to change or interruption.

Section 12 - Food Consumption Inventory -- Five questions were developed by this research team primarily to extract the relationship of the participant's eating habits with certain aspects of his/her serum cholesterol levels.

Section 13 - Background Information -- In the background section, SAP II assesses five different facets: demographics (age, sex, education, height/weight, marital status, job level); selected stress-related illnesses; exercise; smoking; and medication usage. This was done in order to control for these different facets, if need be, or to assess their direct relationship.

Category 4 - Perceived Productivity. SAP II kept the same four questions that were utilized in SAP I to measure perceived productivity. All questions were used from Section 3.

Category 5 - Perceived Stress. SAP I's two perceived stress questions were expanded to ten in hopes of increasing



reliability and obtaining a more comprehensive area. The attempt was to examine perceived stress from three different facets: 1) organizational stress; 2) extraorganizational stress; and 3) individual stress. However, the individual stress questions seemed to measure the individual's tolerance for change, so it was placed under individual traits instead. In the final analysis, only three questions were used. Question 118, "I feel a great deal of stress and anxiety in the performance of my job," was used to measure organizational stress. Question 119, "My unfulfilled home life greatly adds to my frustration," and question 120, "My lifestyle away from my job is extremely tense and stressful," were used to measure external stress. The three questions, together, from section 10 measured overall stress. Question 117 was rejected because it had too much autocorrelation with organizational stress. Question 116, "I am extremely frustrated by my fight for social acceptance," was placed under Category 2 - Extraorganizational Environment.

#### Questionnaire Administration

Questionnaires were administered in conjunction with stress seminars given by the Organizational Behavior Department of the Air Force Institute of Technology, AFIT/LSB. The seminars utilized the following schedule:

Introduction	0800-0825
Survey Completion	0825-1100
Lunch Break	1100-1300
Selected Feedback and Film or Live Presentation	1300-1530
Blood Drawing	1530-1600

Questionnaires were administered to 438 participants at the locations shown in Table 4.

TABLE 4  
Sample Population

Location	Questionnaire Results	Bloodwork Obtained	Incomplete Bloodwork
Metropolitan Hospital, San Antonio, TX	29	26	
Champus, Denver, CO	108	104	
Langley AFB, VA	116	100	
Wright-Patterson AFB, OH	60	35	
Brooks AFB, TX	26	17	6
Randolph AFB, TX	59	48	5
Wilford Hall, Dental Dept, Lackland AFB, TX	40	27	
Total	438	357	11

Blood samples were drawn at the end of the seminars with the participant's approval. A total of 357 samples were obtained for statistical analysis.

In addition, 87 of the participants were also administered a 23-item locus of control scale (the Rotter scale) without distractors. Ninety-six participants were given the Jenkins Activity Survey for Type A/B behavior. One hundred fifty-two of the participants were administered a modified Life Events Survey.

Two hundred ninety of the participants were also administered the special enjoyment versus time ratio questions that

were discussed in the last chapter. These ratios were measured by asking the participants:

A. What percentage of your total satisfaction comes from your

1. Job
2. Family
3. Friends
4. Hobby

B. What percentage of your time is spent in thinking about or doing your

1. Job
2. Family
3. Friends
4. Hobby

The scale utilized with these questions is as follows:

- |     |           |
|-----|-----------|
| 1 = | 0 - 15%   |
| 2 = | 16 - 30%  |
| 3 = | 31 - 45%  |
| 4 = | 46 - 60%  |
| 5 = | 61 - 75%  |
| 6 = | 76 - 90%  |
| 7 = | 91 - 100% |

Ratios for each category were computed by dividing the response for the percentage of enjoyment by the time spent in doing or thinking about each category.

The sample consisted of 438 individuals who ranged in age from 18 to 74, with a mean of 40.152 years. There were two Indians (.5 percent), two Asians (.5 percent), 22 Blacks (5.0 percent), 20 Hispanics (4.6 percent), 388 Caucasians (88.5 percent), and four who declined to answer (.9 percent).

The sample contained 269 males (61.4 percent), 167 females (38.4 percent), and two participants failed to answer (.2 percent).

The education levels of the sample group consisted of 38 individuals with Doctorate degrees, two had Master's degrees, 43 held more than Bachelor's degree, but less than a Master's degree, 60 had Bachelor's degrees, 136 had some college without completing a degree, 57 were high school graduates only, one had not completed high school, and one person failed to answer the question.

#### Blood Analysis

USAF School of Aerospace Medicine (USAFSAM/NPG), Brooks AFB, Texas conducted the blood analysis to insure uniformity of procedures. Blood plasma, extracted from the participant samples, was screened for total cholesterol, HDL cholesterol, and cortisol. The enzymatic method for analyzing plasma cholesterol utilized BMC autoflo cholesterol reagents (catalogue number 14893, biodynamics/bmc, Indianapolis, IN 46250) and ABA-100 biochromatic analyzer (Abbot Laboratories, North Chicago, IL 60064).

The USAF School of Aerospace Medicine checked their standard against the lipid standards from the National Bureau of Standards, as well as with those from the Center for Communicable Diseases. Variations for the cholesterol method had less than a 2.5 percent between-day coefficient. HDL cholesterol was analyzed by using the aforementioned enzymatic method

or by checking the serum supernatant after phosphotungstic acid precipitation, with less than 1.0 percent coefficient of variations.

Blood samples were collected after 1500 hours to control for the diurnal pattern of cortisol. The different participant wake-up times, due to lack of variation, did not affect the afternoon readings. Cortisol was analyzed through the Gamma Coat Cortisol RIA technique (Clinical Assays catalogue numbers CA - 529 and 549, Cambridge, MA 02139).

### Statistical Analysis

Each question in this section was considered to be a possible variable in the factor analysis or the subsequent regression analysis. Therefore, when a specific question is referred to, it is identified as a variable followed by its question number (i.e., Variable 135 refers to Question 135 in the questionnaire).

Shortened alpha numeric notation, using the letter V to refer to variable, or F for factor, is also utilized (i.e., V135 refers to Question 135, while F1 refers to Factor 1 - locus of control).

Factor analysis was conducted on the 438 questionnaires to reduce the 160 variables to an amount suitable for follow-on regression analysis. The factor analysis was performed on variables 1 through 135, 140, 144, 151, 155, 156, 158 and 159. Orthogonal rotation (varimax) was used to group the variables into factors in order to reduce the total number of variables.

For missing values in any one case, the mean value of that variable over all cases was substituted in order to make maximum use of the cases without distorting the variable values. In addition to reducing the total variables, factor analysis identified 25 factors that were utilized for each participant's personal feedback. The reliability of each of these 25 factors was verified using Cronbach's Alpha coefficient.

In the follow-on regression analysis, three different populations were used: 1) where a dependent or independent variable contained cortisol or cholesterol ratio, then only those cases where complete bloodwork was available were included (359 cases); 2) where the participant had complete bloodwork without using medication (medication was found to be insignificant by comparing coefficients of determination in the different regressions); and 3) where blood was not included, all 438 cases were used.

Using these three populations, the factors identified through the factor analysis, along with all variables not included in the factors, were used as independent variables in stepwise multiple regressions against the following six dependent variables:

1. The Ratio of Total Cholesterol to HDL Cholesterol
2. Cortisol
3. Organizational Stress (V118)
4. Extraorganizational Stress  $(V119 + V120)/2$
5. Total Stress  $(V118 + V119 + V120)$

6. Perceived Productivity (V30 + V31 + V32 + V33)/4

Stepwise multiple regressions were also run with the factors only, as independent variables, with the above six dependent variables. In addition, the six dependent variables listed above were brought in as independent variables, along with all other independent variables, in a regression.

Regressions were also completed using the enjoyment/time ratios as independent variables with the aforementioned six dependent variables. Also, regressions were run using Stress, Organizational Stress, External Stress, and Productivity as dependent variables and stress-related illnesses as independent variables. Cortisol and cholesterol ratios were not used as dependent variables in this case because people with these diseases may be on medication that could change the blood results.

A computed average of variables included in the factor was used, and not factor scores, in the regressions. The regression method was stepwise inclusion (Cohen, Foster, Helm & Tuccy, 1978). This method is an extended version of forward inclusion where the order in which variables are entered into the regression equation are entered one-by-one in a series of regression steps. At each step, one variable is chosen from among those which are eligible for entry into the regression equation. The variable selected is the one that explains the greatest amount of variance unexplained by those variables already in the equation; that is, the variable which, if added, would bring about the greatest reduction in the residual sum

of squares. However, unlike the forward method, variables already in the equation may be removed. After each regression step, those variables already in the equation having odd inclusion levels are re-examined to determine if they still provide a significant contribution to the regression analysis. Judgment regarding the significance of their contribution is based upon the individual F ratios. Any variable removed from the equation becomes eligible for re-entry later on. This method was felt by the research team to be better at explaining possible autocorrelation.

Feedback. Participant feedback was provided by a computerized listing. This gave the participants their scores on each of the 25 factors, along with their blood results and Rotter score, if applicable. Participants were also provided with each factor's average score in order to determine their standing in relation to the other individuals. Feedback was provided by means of survey case number in order to protect the participants' privacy.



## CHAPTER III

### ANALYSIS

The purpose of this chapter is to state and discuss the results of the statistical analysis.

#### Factor Analysis and Reliability

Factor analysis on SAP II questionnaires yielded 25 factors. The criteria for selection of the factors were: 1) at least two variables loaded on a factor; 2) the variables were logically related; 3) they had a reliability greater than .67; and 4) the variables within the factor had a factor loading greater than .50. Factors were identified as follows:

Factor 1 - Internal/External Locus of Control. Eleven variables (variables 1-9, 11, 12) loaded highly with this factor. Internal Locus of Control, as previously discussed in the literature review, refers to individuals who believe that they have control over their destiny. External locus of control refers to those who believe just the opposite, i.e., that their lives are ruled by luck, chance or fate. Cronbach's alpha for this factor was .81. The mean response was 2.98. Participants who score in the 2 or below range could be considered as internal, while those who scored in the range of 5 or above would be considered external. A Pearson's Product correlation was run to compare the SAP II factor scores

with the 87 Rotter scores. The correlation was .23, which is very low considering all questions were derived from the same source. However, there was significance at the .01 level.

Factor 2 - Type A/B Behavior Pattern. This factor was composed of variables 21-23, 28, and 29. The mean response was 4.59. Participants who scored in the 1-2 range would best be described as Type B. Participants who scored in the range of 6 and 7 would be Type A. A Pearson's correlation was run to compare several facets of this study's Type A/B behavior factor with the 96 who had completed the Jenkins Activity Survey. The correlation was .43, with a significance of .001. However, this study's factor only measured the time urgency and impatience aspect of type A behavior (McDonald, 1982). Cronbach's alpha was .76.

Factor 3 - Perceived Productivity. Variables 30-33 loaded high on this factor. The mean factor response was 5.79 on a 7-point scale, with 7 being the highest level of perceived productivity. Cronbach's alpha was .83.

Factor 4 - Job Autonomy. Variables 34-35 loaded high on this factor. The mean response was 4.77 on a 7-point scale, with 7 being the highest rate of job autonomy. The reliability of scale for this factor was Cronbach's alpha equal to .89.

Factor 5 - Planning Time. This factor looked at the extent to which a participant's time is spent in planning. Variables 36-37 loaded highly on this factor. This factor utilized a 7-point scale with upper scores being a great amount of time and lower scores being a minimal amount. The mean was

3.56, and the Cronbach alpha reliability was .82.

Factor 6 - Intergroup Conflict. The variables making up this factor, variables 39-40, examined to what extent:

1) there was conflict between the participant's work group and another work group within the organization; and 2) there was conflict between the participant's organization and another organization with which there are work-related dealings. The extent of conflict was on a 7-point scale, with 7 being to a great extent. The mean response was 3.16. Cronbach's alpha was .67.

Factor 7 - Task Significance. Variables 44-45 loaded highly on this factor in an attempt to measure to what extent the participant's job affects others. This factor again used the 7-point scale, with 7 being high significance and 1 being not at all. The mean response was 5.50, and the Cronbach alpha reliability was .89.

Factor 8 - Goal Clarity. This factor utilized variables 47-48 to determine how well the participant knows what is expected of him/her in job performance. It utilized the 7-point scale, with 7 being to a great extent and 1 being not at all. The mean response was 4.70. The Cronbach alpha reliability was .83.

Factor 9 - Need for Enrichment. Variables 49-51 were used to measure, on the 7-point scale, the participant's need for enrichment. The mean response of 6.09 showed great desire for enrichment in general. Cronbach's alpha was .84.

Factor 10 - Group Goal Setting. This factor used the

7-point scale to measure work group participation in setting goals. Variables 46 and 55 loaded highly on this factor. The mean response for this factor was 3.88, or "to a moderate extent." Cronbach's alpha for reliability was .68.

Factor 11 - Problem Solving Participation. This factor used the 7-point scale to measure the allowance and usage of the participant's ideas in solving organizational problems. Variables 59-60 loaded highly on this factor. The mean response was 4.74. The Cronbach alpha reliability was .92.

Factor 12 - Job Enhancement. Variables 56-58 loaded highly on this factor. This factor used the 7-point scale to measure the participant's assessment of how much the job allows him/her to use talents and training to accomplish a worthwhile job. The mean response was 4.89, indicating most participants believe their jobs do this fairly well. Cronbach's alpha for this factor was .86.

Factor 13 - Supervision. Variables 64-74 all loaded highly on this factor. On the 7-point scale, the mean response was 4.80, indicating most participants have a slightly favorable impression of their supervisors' abilities. The reliability of scale was .86.

Factor 14 - Supervisory Control. Variables 75-76 loaded highly on this factor. The mean response of 4.30 indicates most people neither agree nor disagree that their supervisors provide control. The reliability for this factor was .81.

Factor 15 - Micro Supervision. Variables 77-78 loaded highly on this factor. The mean response of 4.50 indicates

most people only slightly agree that supervisors spend too much time in minor details and unnecessary paperwork. The alpha for this factor was .72 .

Factor 16 - General Organizational Climate. Variables 79-83 all loaded highly on this factor. The mean response of 4.50 on the 7-point scale indicates participants slightly agree that their organizational climate is good. The reliability of scale was .87.

Factor 17 - Organizational Control. Variables 86-87 loaded highly on this factor. The mean response was 3.38 on the 7-point scale, indicating that participants slightly disagree that the organization's rules are restrictive. The reliability was .88.

Factor 18 - Coworker Relations. Variables 88-89 made up this factor. The mean response of 5.99 indicates most participants have a good relationship with their peers. The reliability was .69.

Factor 19 - Assertiveness. Variables 103-107 all loaded highly on this factor. The mean response, on a 7-point scale, was 4.55, indicating participants considered themselves assertive to a fairly large extent. The alpha was .82.

Factor 20 - Community/Social Activity. Variables 108-110 all loaded highly on this factor. The mean response of 3.24 on the 7-point scale indicates most people slightly disagree that they are active in the social sphere of community life. The reliability was .82.

Factor 21 - Family Relations. Variables 126-130 all

loaded highly on this factor. The mean response was 5.14, indicating that, to a fairly large extent, things within the family environment are going well for most of the participants. Cronbach's alpha was .92.

Factor 22 - Exercise. Variables 155-156 loaded highly on this factor. The mean response of 2.39 indicates most survey participants do not participate actively in an exercise program. The reliability of this factor was .82.

Factor 23 - Job Satisfaction. Variables 99-102 make up this factor. The mean response of 5.18 on a 7-point scale indicates most participants found some degree of satisfaction with their work. The reliability of scale was .90.

Factor 24 - Tolerance for Change. Variables 121-124 all loaded together for this factor. The mean response was 4.12, which indicates participants tend to resist change. Another way of looking at this is that only slightly more people were intolerant of change than those who could tolerate it. Cronbach's alpha was .71.

Factor 25 - Dietary Fat. Variables 133-134 loaded highly with this factor. The mean response was 4.72, indicating most participants eat beef, pork and fried foods between five and seven times a week. Cronbach's alpha was .67.

Perceived External Stress. The variables composing external stress were also identified through factor analysis. Variables 119-120 made up this factor, with an alpha of .71. The mean response was 2.71 on a 7-point scale. This indicates most of the participants slightly disagreed with the

idea that things outside the job were stressful for them.

### Multiple Regression Analysis

After using factor analysis to reduce the number of variables, multiple regression analysis was used to identify the variables/factors that significantly affect the dependent variables: perceived stress, physiological components, and perceived productivity. Throughout the procedures, the significance level of the stepwise regressions was controlled at the alpha equal to .10 level. The results of the regressions performed are illustrated by tables. The tables list the variables/factors that entered into the regression equation in the order of entry, with the last variable/factor to enter at the .05 significance level being underscored by a broken line. The tables show the coefficient of determination ( $R^2$ ); the change in ( $R^2$ ); the standardized regression coefficient, beta value; and the significance of each variable in the final regression equation. The coefficient of determination and the change in  $R^2$  show the percentage of variance explained by each variable. The beta value indicates whether the relationship is direct or inverse. Restated in other words, as each variable/factor enters the equation, it contains its variance plus the variables already in the equation. This might tend to leave out some of the variables that have high intercorrelation with variables that are already in the model. However, with the stepwise regression method selected, if a variable or variables enter and absorb a percentage of the variance shared by a variable already in the equation, it could change the

significance of that variable enough to cause it to be removed from the equation. The F value selected to remove a variable was .005. This essentially had no effect at the significance level used. The notation for variables not included in the factors contains the letter V, followed by the question number in SAP II. For example, V154 (i.e., variable 154) identifies the physical stature of a participant.

One of the first problems was testing whether or not medication significantly affected the bloodwork results. To check this, backward regressions were run, and differences in the coefficients of determination were noted. Backward elimination provides an opportunity to examine the regression with all variables. It then allows the number of variables in the equation to be reduced to those providing the best regression fit. The regressions were run by using cortisol and the cholesterol/HDL ratio as dependent variables. Medication, along with all significant variables found by the stepwise regression, were the independent variables. When cortisol was utilized as the dependent variable, the coefficient of determination was reduced by .003, from .09534 to .09237, without bringing in medication. With cholesterol ratio as the dependent variable, medication was the third variable removed. The difference in the coefficient of determination without medication was only .0001, less than with medication, reducing from .21818 to .21817. It was, therefore, deduced that medication had no significant effect on the results. Any differences in regression results were due to reducing the full sample of 351



participants to the reduced sample of 202 without medication.

Each research question is answered with a data table, if significant, compiled from this research team's statistical exploration, and a discussion. The discussion covers each regression utilized to answer the research questions when applicable. The difference between regressions is explained by the new variables brought in. These additional variables draw variance away from the previous regression's variables, thereby rendering them insignificant. Each regression variable will be examined.

#### Research Question 1

What organizational, extraorganizational and individual facets are predictive of perceived overall stress (V118 + V119 + V120)? Table 5 gives the results of a regression with perceived overall stress as the dependent variable and all the factors identified by factor analysis as independent variables.

TABLE 5  
Regression Analysis Results  
Dependent Variable: Perceived Overall Stress  
Independent Variables: All Factors

Factor	Facet	R <sup>2</sup>	Change in R <sup>2</sup>	Beta	Signi- ficance
21	Family Relations	.12911		-.311	.000
1	Locus of Control	.21649	.087	.136	.004
17	Organizational Control	.26455	.048	.114	.018
2	Type A/B Behavior	.29895	.034	.156	.001
24	Tolerance for Change	.31716	.018	.159	.001
8	Goal Clarity	.33261	.016	-.119	.011
6	Intergroup Conflict	.34556	.013	.112	.017
3	Perceived Productivity	.35507	.010	.098	.026
4	Job Autonomy	.36081	.006	-.083	.079

Table 6 gives the results of the regression with perceived overall stress as the dependent variable and all factors, along with all variables not included in the factors, as independent variables.

TABLE 6

Regression Analysis Results  
 Dependent Variable: Perceived Overall Stress  
 Independent Variables: Factors and Variables Not  
 in Factors

Factor/ Variable	Facet	R <sup>2</sup>	Change in R <sup>2</sup>	Beta	Signifi- cance
F21	Family Relations	.20209		-.348	.000
V112	Active Social Life	.30056	.099	-.235	.000
V26	Try To Do Too Much	.36131	.061	.102	.025
V92	Assignment w/o Resources	.39767	.036	.110	.012
V116	Fights for Social Acceptance	.42138	.024	.140	.001
V20	Ambitiousness (Type A/B)	.44081	.019	-.106	.014
V85	Given Task by Other Than Supervisor	.45200	.011	.111	.006
F1	Locus of Control	.46181	.010	.137	.002
V27	Impatience (Type A/B)	.47138	.010	.084	.052
F14	Supervisory Control	.48165	.010	.137	.001
	Age	.48969	.008	-.085	.033
V141	Number Supervised	.49503	.005	.092	.024
F8	Goal Clarity	.50040	.005	-.137	.084
V52	Job Requirements In Line With Interests	.50693	.007	.157	.001
V14	Responsible for Own Mistakes	.51185	.005	.069	.078
V100	Job Security Satis- faction	.51700	.005	-.070	.084
V131	Frequency of Eating Eggs	.52135	.004	.079	.041
V13	Breaks Make Manager	.52577	.004	-.084	.048

Table 6, continued

Factor/ Variable	Facet	R <sup>2</sup>	Change in R <sup>2</sup>	Beta	Signifi- cance
V113	Satisfaction from Things Enjoyed	.53030	.005	.069	.079
V94	Subject to Whim of Others	.53432	.004	.077	.092

In the regression running stress as the dependent variable and the same independent variables as above, along with cortisol and the cholesterol ratio, no significant changes developed at the .10 level. Organizational stress and external stress were left out as possible independent variables because they make up the dependent variable.

Discussion. This section examines each factor and variable significantly affecting perceived overall stress.

Factor 21 - Family Relations: This factor was negatively related to perceived overall stress. Consequently, as the home environment deteriorates, perceived stress increases.

Factor 1 - Locus of Control: This factor was directly related to overall stress. The more external locus of control a person is, the higher the overall stress levels. This is also consistent with previous findings (Fye & Staton, 1981; Anderson, 1977).

Factor 17 - Organizational Control: This factor was directly related to overall stress. Consequently, as an organization's control becomes restrictive on a person, overall stress increases.

Factor 2 - Type A/B Behavior: This factor was directly related to overall stress, making it consistent with previous studies in the same area. The more Type A behavior an individual exhibits, the higher the stress level.

Factor 24 - Tolerance for Change: This factor was also directly associated with overall stress. This essentially means the less individuals are able to tolerate interruptions or inconsistencies in their daily lives, the more overall stress they will experience.

Factor 8 - Goal Clarity: This factor was negatively associated with overall stress. Illustrating an individual's overall stress level increases as the organization's goals become less well defined.

Factor 6 - Intergroup Conflict: Intergroup conflict was directly associated with overall stress. This signifies personnel who continually face conflict in their jobs, groups and/or other organizations have higher overall stress levels.

Factor 3 - Perceived Productivity: This factor was also directly related to overall stress. Consequently, the better an individual perceives his/her work group's productivity, the higher the perceived stress. This could be a logical step in explaining how highly production-minded organizations tend to foster increased stress levels in their employees.

Factor 4 - Job Autonomy: This factor was negatively related to overall stress, which indicates that a low degree of autonomy would cause a high degree of overall stress. The more freedom an individual has in his/her job, the more

decisions he/she has to make. The necessity of determining a course of action requires choice in ambiguous situations, relegating the burden of decision-making on the employee.

Factor 14 - Supervisory Control: This was directly related to overall stress, although it only became significant when other questions were brought in to draw variance away from other factors, making them no longer significant. The positive relationship implies that when the supervisors provide direction for tasking, stress is reduced. Employees are relieved of stress-producing decision-making, leaving them more time for performing the task at hand.

Question 112 - "I lead an active, fulfilling social life": This statement was negatively associated with overall stress, indicating that those who do not lead an active social life tend to lead a more stressful existence. Ever since the beginning, people have had the need to associate with their own kind. Relationships are a necessary part of human development. Individuals tend to rely on social systems for support in stressful situations.

Question 26 - "I frequently try to do too much, and as a result I feel tired most of the time": This question is a Type A/B behavior question that correlates directly with overall stress. This again underscores the concept that Type A behavior individuals have a higher level of perceived overall stress. These hard-driving and achievement-oriented people tend to overextend themselves in an effort to achieve their goals (Glass, 1977). This, combined with a strong sense of

competition and time urgency (Goldband, 1980), no doubt robs them of most energy to do other than what their job requires.

Question 92 - "I receive an assignment without adequate resources and materials to execute it": This statement was directly associated with perceived stress. Personnel for whom this is true would have higher levels of stress. This is altogether feasible, especially in the presently popular management practices of "doing more with less." Managers have a tendency to exploit this concept, causing increasing levels of strain on their employees.

Question 116 - "I am extremely frustrated by my fight for social acceptance away from the job": This statement was directly associated with perceived overall stress. As discussed in Question 112, most people have a need to belong to a social system. Lack of contact with important others outside of an individual's job environment tends to aggravate an already stressful situation. According to Abraham H. Maslow, people have a hierarchy of needs that have to be fulfilled for satisfaction in life (Albanese, 1981). Social acceptance ranks highly in the personal development of a well-adjusted individual.

Question 20 - "I maintain work standards that I can make without overextending myself, and I do not get upset if I occasionally fail": This statement is the high end of the scale for statement 20 and is indicative of Type B behavior pattern. This was negatively related to perceived overall stress, indicating the more Type B a person's orientation, the

less stress. This supports previous findings (Chesney & Rosenman, 1982) showing Type B individuals to be more relaxed, deferent, and patient. These individuals rarely become caught in a struggle to achieve despite constraints imposed by their job.

Question 85 - "People equal to or above my supervisor's position give me tasks without going through my supervisor": This question relates to the "one employee, one boss" concept. It is directly related to stress, indicating the more people giving the employee orders, the higher his/her stress levels. Management has been aware of this problem for years (Kossen, 1981). Employees in an organization must have a clear concept of who works for whom in order to prevent duplication of efforts and misunderstandings.

Question 27 - "I eat fast, because sometimes I feel that I could put the time I use eating to better use": This statement is clearly a measurement of Type A behavior pattern and is again directly associated with perceived overall stress (Glass, 1977). The more Type A time urgency behavior exhibited by an individual, the higher the perceived stress.

Age: Age was negatively related to stress. In other words, the younger the individual, the greater the perceived stress. Keeping in mind that the age range was 18 to 74, with a mean of 40.15, results are logical. The younger people are striving for success, starting families and gaining more responsibilities, while the older individuals are relatively established in their jobs and society (Eyer, 1980).

Question 141 - "How many people do you directly supervise?" This question was directly associated with overall perceived stress, indicating the more people supervised, the higher the perceived stress. Efficient management requires a good span of control. Supervisors are necessary to accomplish the organization's goals. They are key people, responsible for their work and the work of others. Different people have different tolerance levels. Perceived stress increases as responsibility builds up, reaching its peak at various levels, depending on an individual's capability and current job demands.

Question 52 - "To what extent are the requirements placed on you in your job in line with your interests and values?" This question is directly related to perceived stress. Consequently, the more an individual's job requirements are in line with his/her interests and values, the higher the perceived overall stress. One explanation is the more an individual believes in the job's merit, the more he/she will put effort into accomplishing it fully, creating a possible overwork situation. Relinquishing one's social life in favor of accomplishing a job is necessary in some instances. However, constant infringement of personal or relaxation time could cause perceived stress in an individual. Vacations are commonly utilized as a means of refreshing a person's outlook, giving a needed rest from job stress.

Question 14 - "Usually, individuals have misfortunes due to their own mistakes": This is an internal locus of



control statement, directly associated with perceived overall stress. The more one agrees with this statement, the more he/she is an internal locus of control type and the higher the perceived stress. This is contrary to earlier regression results for Factor 1, which indicated the more internal locus of control a person is, the lower the perceived overall stress. One possible explanation is that SAP II participants could be using the word "misfortune" to mean natural catastrophies or accidents outside the individual's control.

Question 100 - Job Security: This question was designed to measure the participant's satisfaction with his/her chosen profession's job security. It is negatively associated with perceived overall stress. The result is what would be expected: the less satisfied with job security, the higher the stress.

Question 131 - "How many times do you consume eggs?" This question was originally designed to measure cholesterol levels, however it directly relates to perceived overall stress. Consequently, the more eggs a person eats, the higher the perceived stress levels. A possible explanation for this might be that, for the most part, the "egg eater" is a Type A person who gets up early, eats a "good All-American Breakfast" to help keep him/her "on the go" to better fight corporate battles.

Question 13 - "Without the right breaks one cannot become effective as a manager": This is a locus of control question that associates negatively with perceived stress. The

more an individual agrees with this question, the more he/she is external locus of control and the lower the perceived stress level. This statement adds confirmation to question 14, but refutes Factor 1. A possible explanation is because external locus of control individuals believe they have no control on their environment, they have developed coping mechanisms to deal with it (i.e., rationalizing).

Question 113 - "I find satisfaction in doing something I enjoy": This question is directly related to stress. Consequently, the more satisfaction one derives from doing what he/she enjoys, the higher the perceived overall stress. One possible explanation for this result is that participants are not doing things, or never get a change to do the things, they enjoy. Thus, creating a higher perceived stress.

Question 94 - "I am just a pawn subject to the whims of others": This question is directly related to stress. The more an individual agrees with this statement, the higher the perceived stress levels. Any person believing Question 94 to be true would be external locus of control motivated. This individual would also appear to lack assertiveness, indicating a possible low self-esteem.

### Research Question 2

What organizational, extraorganizational, and individual facets are predictive of perceived organizational stress (V118)? Table 7 gives the results of the regression with organizational stress as the dependent variable and all the factors

TABLE 7

Regression Analysis Results  
 Dependent Variable: Perceived Organizational Stress  
 Independent Variables: All Factors

Factor	Facet	R <sup>2</sup>	Change in R <sup>2</sup>	Beta	Signifi- cance
17	Organizational Control	.10800		.119	.017
4	Job Autonomy	.16333	.055	-.227	.000
2	Type A/B Behavior	.22233	.059	.152	.002
6	Intergroup Conflict	.24968	.027	.153	.002
1	Locus of Control	.26621	.017	.099	.047
24	Tolerance for Change	.27798	.012	.138	.005
8	Goal Clarity	.28912	.011	-.141	.007
12	Job Enhancement	.29967	.010	.237	.000
23	Job Satisfaction	.31621	.017	-.185	.004

as independent variables.

Table 8 gives the results of the regression with perceived organizational stress as the dependent variable, and all the factors, plus all the variables from SAP II not included in the factors, as independent variables.

The changes caused by adding cortisol, cholesterol ratio, and external stress into the Table 8 regression are summarized in Table 9.

Discussion. All the factors that were significant with perceived organizational stress were also significant with perceived overall stress in the same negative or positive direction. The two exceptions were Factors 12 and 23, which will be examined. It should also be noted that Factor 21 - Family Relations - and Factor 3 - Perceived Productivity - were significantly related to perceived overall stress, but not to

TABLE 8

Regression Analysis Results  
 Dependent Variable: Perceived Organizational Stress  
 Independent Variables: Factors and SAP II Questions

Factor/ Variable	Facet	R <sup>2</sup>	Change in R <sup>2</sup>	Beta	Signifi- cance
V19	Aggressiveness (Type A/B)	.12496		-.217	.000
V94	Subject to Whim of Others	.21523	.090	.123	.017
F17	Organizational Control	.25290	.038	.118	.013
V20	Ambitiousness	.28380	.031	-.126	.007
V41	Realistic Job Perform- ance Goals	.31460	.031	-.108	.031
V116	Fights for Social Acceptance	.33602	.021	.130	.004
V54	Job Requires Communica- tion Between Coworkers	.35323	.017	.066	.163
F4	Job Autonomy	.36670	.014	-.139	.004
F8	Goal Clarity	.37609	.009	-.130	.007
V62	Job Requires Variety of Skills and Talents	.38755	.012	.119	.018
V141	Number Supervised	.39536	.008	.096	.031
F24	Tolerance For Change	.40270	.007	.094	.042
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V132	Frequency of Eating Dairy Products	.40852	.006	.087	.040
F6	Intergroup Conflict	.41448	.006	.090	.057
V115	Feeling Guilty When Not Working on Career	.41991	.005	.079	.078

perceived organizational stress. It is conceivable that either of these factors could relate to perceived organizational stress; however, they apparently added nothing to the prediction above and beyond that accounted for by Factors 12 and 23.

Factor 12 - Job Enhancement: This factor was directly related to perceived organizational stress. This means the

TABLE 9

Regression Analysis Results  
 Dependent Variable: Perceived Organizational Stress  
 Independent Variables: Factors, SAP II Variables,  
 Cortisol, External Stress, Cholesterol Ratio

Factor/ Variable	Facet	R <sup>2</sup>	Change in R <sup>2</sup>	Beta	Signifi- cance
V19	Aggressiveness (Type A/B)	.12496		-.204	.000
V94	Subject to Whims of Others	.21526	.093	.155	.002
F17	Organizational Control	.25290	.038	.145	.010
	External Stress	.28660	.034	.145	.002
F4	Job Autonomy	.31826	.032	-.175	.000
V54	Job Requires Communi- cation Between Coworkers	.33757	.019	.093	.047
V41	Realistic Job Perform- ance Goals	.35347	.016	-.130	.008
V20	Ambitiousness (Type A/B)	.37250	.019	-.104	.029
V116	Fights for Social Acceptance	.38431	.012	.125	.005
V62	Job Requires Variety of Skills and Talents	.39344	.009	.118	.018
F8	Goal Clarity	.40436	.011	-.108	.023
V141	Number Supervised	.41170	.007	.086	.055
V132	Frequency of Eating Dairy Products	.41774	.006	.082	.049
F2	Type A/B Behavior	.42284	.005	.086	.074
	Cortisol	.42817	.005	.075	.079

more an individual can use his/her talents and training to accomplish something worthwhile in his/her job, the more perceived organizational stress. A possible explanation is when employees feel the organization believes in them, they tend to rise up to meet these higher expectations. Self-esteem, according to Maslow (Albanese, 1981), becomes a strong

motivating force in an individual striving to improve his/her image in the eyes of others.

Factor 23 - Job Satisfaction: This factor was negatively related to stress, indicating the more satisfied people are with their jobs, the lower their stress levels. This is what would normally be expected.

Eight questions were related to organizational stress that were not related to overall stress. Their discussion follows.

Question 19 - "I will not overextend myself, even if it means not getting something done": This is similar to Question 20, previously discussed, and is indicative of Type B behavior pattern. This question is negatively correlated with perceived organizational stress, thus the more a person's Type B behavior pattern, the less perceived organizational stress. This substantiates prior research (Glass, 1977a). Type B individuals exhibit unhurried behavior and, unlike Type A individuals, rarely get caught in a struggle to achieve despite time constraints.

Question 41 - "To what extent are your job performance goals realistic?" This question was negatively related to perceived organizational stress. Consequently, the more realistic an individual's job performance goals, the less perceived organizational stress. Mature people know what they can realistically accomplish, so they pace themselves in order to complete their job goals with the least amount of disruption.

Question 54 - "To what extent does your job require

communication between workers?" This question was directly related to organizational stress. Modern organizations have an enormous need for effective communication. Many corporations have expanded from national to international scope. As a result, employees are also feeling the added responsibility of having to deal with an increased amount of coworkers to get the job done. The more people an individual has to communicate with, the more his/her perceived organizational stress.

Question 62 - "To what extent does your job require you to do many different things, using a variety of your talents and skills?" This question is directly related to perceived organizational stress, meaning the more routine the job, the less the stress. This makes sense from the point of view that under normal circumstances a routine job will have less responsibility, thus less perceived organizational stress.

Question 132 - "How many times do you consume dairy products?" This factor is directly related to perceived organizational stress. Americans tend to consume many dairy products as a normal part of their diet. This question was designed to measure cholesterol. However, one possible explanation is that individuals drink large amount of milk to alleviate the physical problems of stress (i.e., ulcers).

Question 115 - "I feel guilty when I'm not working on furthering my career." This statement's objective was to measure the career versus social activity internal conflict. This statement is directly related to perceived organizational stress, which is not surprising. Type A individuals are

very career-minded and have a strong desire to compete (Goldband, 1980).

Perceived External Stress - This area also related significantly in a direct manner with perceived organizational stress. The more perceived stress outside the job, the more perceived organizational stress. According to Parkes, Benjamin and Fitzgerald,

Unhappiness in non-occupational areas such as marital and family relations has also been implicated in the occurrence of coronary disease, and acute stressors over which the individual has little control--for example, the sudden death of a spouse--have been correlated with the subsequent onset of cardiac disorders. (Glass, 1977, p. 177)

Cortisol - Cortisol had a direct relationship to perceived organizational stress. Currently, the relationship between perceived stress and cortisol is unclear. Fye and Staton (1981) concluded, after researching the studies on cortisol, the relationship might indicate that acute stress increases cortisol and chronic stress decreases cortisol. If it can be assumed that most organizational stressors are, in fact, acute, then this is what would be expected.

### Research Question 3

What organizational, extraorganizational and individual facets are predictive of perceived external stress? Table 10 gives the results of the regression with external stress as the dependent variable and all the factors as independent variables.



TABLE 10

Regression Analysis Results  
 Dependent Variable: External Stress  
 Independent Variables: All Factors

Factor	Facet	R <sup>2</sup>	Change in R <sup>2</sup>	Beta	Signifi- cance
21	Family Relations	.28598		-.502	.000
1	Locus of Control	.31760	.032	.123	.008
2	Type A/B Behavior	.33456	.017	.120	.010
19	Assertiveness	.34359	.009	-.083	.067
3	Perceived Productivity	.35001	.006	.082	.059
24	Tolerance For Change	.35564	.006	.082	.082

Table 11 gives the results of a regression with external stress as the dependent variable with all the factors, plus all the variables in the SAP II not included in the factors, as independent variables.

The results, after the variables organizational stress, cortisol, and the cholesterol ratios are brought into the equation, are summarized in Table 12.

Discussion. Factor 1 - Locus of Control, Factor 2 - Type A/B Behavior, and Factor 24 - Tolerance for Change all were significant in a direct manner with perceived external stress as well as with the previously discussed perceived overall stress and perceived organizational stress. This is logical as these are basic character traits commonly associated with perceived stress. Assertiveness, one other character trait, also is significant with perceived external stress that did not come in significant with either perceived overall or external stress. Factors 21 - Family Relations, and

TABLE 11

Regression Analysis Results  
 Dependent Variable: External Stress  
 Independent Variables: Factors and SAP II Questions

Factor/ Variable	Facet	R <sup>2</sup>	Change in R <sup>2</sup>	Beta	Signifi- cance
F21	Family Relations	.28598		-.427	.000
V112	Active Social Life	.37134	.085	-.260	.000
V85	Given Task By Other Than Supervisor	.39975	.028	.143	.000
V27	Impatience (Type A/B)	.41897	.019	.099	.018
V116	Fights For Social Acceptance	.43063	.012	.091	.031
F14	Supervisory Control	.43925	.009	.129	.003
F1	Locus of Control	.44818	.009	.110	.010
V52	Job Requirements in Line With Interests	.45749	.009	.156	.001
V100	Job Security - Satisfaction	.46485	.007	-.086	.038
V131	Frequency of Eating Eggs	.47100	.006	.084	.034
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V14	Responsible for Own Mistakes	.47676	.006	.083	.040
V25	Ambitiousness	.48188	.005	.076	.070
F8	Goal Clarity	.48608	.004	-.079	.098

Factor 3 - Perceived Productivity both were significant with perceived overall stress and perceived external stress, while not significant with perceived organizational stress.

Question 116 - "I am extremely frustrated by my fight for social acceptance away from the job" is the only question outside the factors that was significant with all three types of perceived stress--external, organizational and overall.

Questions 112, 85, 27, 52, 100, 131, and 14 were all

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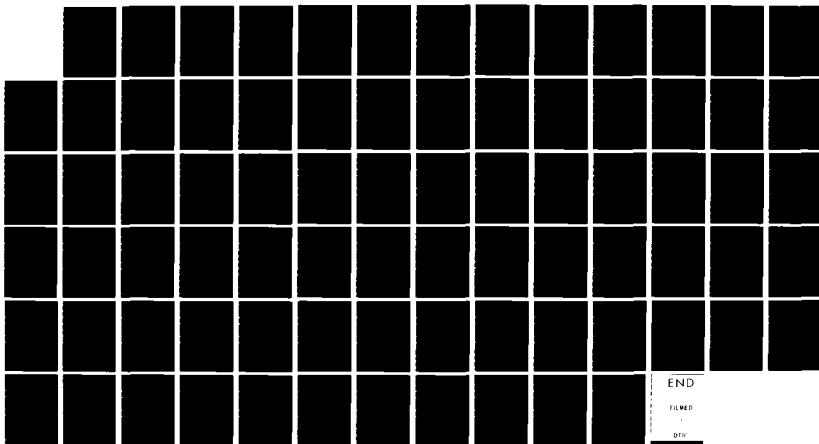
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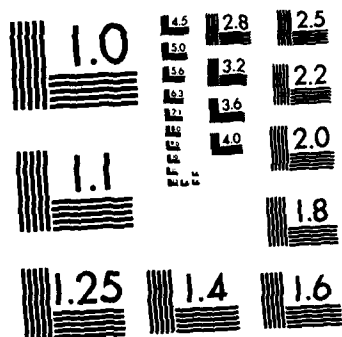


TABLE 12

Regression Analysis Results  
 Dependent Variable: External Stress  
 Independent Variables: Factors, SAP II Questions,  
 Cortisol, Cholesterol Ratio and External Stress

Factor/ Variable	Facet	R <sup>2</sup>	Change in R <sup>2</sup>	Beta	Signifi- cance
F21	Family Relations	.28598		-.415	.000
V112	Active Social Life	.37134	.085	-.247	.000
	Perceived Organiza- tional Stress	.40437	.033	.119	.007
V85	Given Task By Other Than Supervisor	.42461	.020	.143	.000
V52	Job Requirements in Line With Interests	.43846	.014	.137	.001
V27	Impatience (Type A/B)	.44796	.010	.104	.010
V116	Fights For Social Acceptance	.45568	.008	.079	.060
	Cortisol	.46375	.008	-.078	.052
V131	Frequency of Eating Eggs	.46951	.006	.077	.050
V100	Job Security - Satisfaction	.47582	.006	-.088	.032
F14	Supervisory Control	.48173	.006	.086	.035
F1	Locus of Control	.48718	.006	.081	.059

significant with both perceived external stress and perceived overall stress in the same direct or negative fashion. In fact, every factor or variable that loaded with perceived external stress also loaded with perceived overall stress, with the exception of Factor 19 - Assertiveness, and Question 25, which are discussed below. Perceived organizational stress, which was not used as a variable in the regression against perceived overall stress, was also significant and will be discussed.

Factor 19 - Assertiveness: Assertiveness was negatively related to perceived external stress, meaning the less assertive an individual is, the more perceived external stress. This agrees with the findings of Fye and Staton (1981). Assertive behavior could act as a release by keeping stress from building up in an individual. This can be compared to the emergency release valve on a steam engine, whose purpose is to allow pressure to be released, thereby alleviating the possible destruction resulting from excess strain on the unit.

Question 25 - "I set high work standards for myself, and get upset when I don't meet them." This question was designed to measure Type A/B behavior. Obviously the more an individual agrees with the statement, the more Type A oriented he/she is. This statement was directly related to perceived external stress. Consequently, it supports findings for the previously discussed Questions 19 and 20, which related low stress to Type B individuals.

Perceived Organizational Stress - directly related to perceived external stress, indicating the more stressful the job environment, the more stress an individual takes home to his/her family and social life. This concurs with previous research describing how excessive involvement of individuals in demanding organizations can result in

the alienation of the individual from his/her spouse and children, and that such excessive involvement places greater pressures on the family unit.  
(Burke, Weir, and DuWors, 1979, p. 58)

Cortisol: This variable related to external stress in a negative fashion, indicating that as external stress

increases, cortisol level decreases. The research by Mason (1968), in a review of research on the pituitary-andrenal cortical system, indicates psychological factors may either raise or lower the level of pituitary-andrenal cortical activity. He also states the direction of the response depends on the quality of the emotional reaction, the style and effectiveness of the psychological defenses and whether the threat is of an acute or chronic nature. Stress of a chronic nature would continue to use the cortisol, thereby exhausting the pituitary-andrenocortical activity, resulting in lower cortisol levels.

#### Research Question 4

Is there a relationship between perceived external stress and perceived organizational stress? The two earlier regressions with perceived organizational stress and perceived external stress as dependent variables were used to answer this question. The results can be seen in Tables 8 and 12.

Discussion. With perceived organizational stress as the dependent variable, perceived external stress came in at .001 significance and explained 3.37 percent of the variance. Where perceived external stress was the dependent variable, perceived organizational stress came in with .001 significance and explained 3.30 percent of the variance. Therefore, this validates the theory of perceived organizational stress increasing perceived external stress and vice versa.

### Research Question 5

What organizational, extraorganizational and individual facets are predictive of physical stress, i.e., cortisol levels? Table 13 summarizes the results of a regression with cortisol as the dependent variable and all the factors as the independent variables.

TABLE 13

Regression Analysis Results  
Dependent Variable: Cortisol  
Independent Variables: Factors

Factor	Facet	R <sup>2</sup>	Change in R <sup>2</sup>	Beta	Signifi- cance
24	Tolerance For Change	.02487		-.151	.004
21	Family Relations	.04289	.018	.140	.008
18	Coworker Relations	.05457	.012	-.109	.038

Table 14 summarizes the results of a regression with cortisol as the dependent variable and the factors, plus the other SAP II questions, as the independent variables.

Table 15 summarizes the results of a regression run with cortisol as the dependent variable and all the independent variables from Table 14, plus external stress, organizational stress, and the cholesterol ratios.

Discussion. Factor 24 - Tolerance for Change; Factor 21 - Family Relations; Factor 18 - Coworker Relations; Factor 15 - Micro Supervision; and Factor 19 - Assertiveness were all significant with physiological stress (i.e., cortisol). Tolerance for change has been significant in a direct manner with the three different types of perceived stress. However,



TABLE 14

Regression Analysis Results  
 Dependent Variable: Cortisol  
 Independent Variables: Factors and SAP II Questions

Factor/ Variable	Facet	R <sup>2</sup>	Change in R <sup>2</sup>	Beta	Signifi- cance
F24	Tolerance for Change	.02487		-.163	.002
F21	Family Relations	.04289	.018	.139	.007
V95	Impossible to Lose Job	.05746	.015	.108	.035
V141	Number Supervised	.06905	.012	-.174	.001
V38	Work Group Involved in Establishing Goals	.08373	.015	.133	.011
F18	Coworker Relations	.09831	.015	-.134	.009
V152	Cigarette Smoking	.10900	.011	-.109	.034
V15	Aggressiveness (Type A/B)	.11974	.011	-.098	.059
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V136	Months in Organiza- tion	.12845	.009	.129	.018
V137	Months Experience in Job	.13670	.008	-.098	.072

it was negatively related to cortisol levels. Consequently, the more an individual is intolerant of change, the higher his/her stress and the lower his/her cortisol level. In the same manner, Family Relationships is negatively related to perceived overall and perceived external stresses, but directly related to the cortisol level. Therefore, the worse an individual's family relationship is, the higher the stress and lower the cortisol levels. Likewise, assertiveness was negatively related to perceived external stress, but directly related to the cortisol level. This indicates a less assertive individual has more stress and less cortisol.

TABLE 15

Regression Analysis Results  
 Dependent Variable: Cortisol  
 Independent Variables: Factors, SAP II Questions,  
 External Stress, Organizational Stress, and  
 Cholesterol Ratios

Factor/ Variable	Facet	R <sup>2</sup>	Change in R <sup>2</sup>	Beta	Signifi- cance
	External Stress	.03034		-.168	.002
F24	Tolerance For Change	.04532	.015	-.156	.004
V95	Impossible to Lose Job	.06161	.016	.103	.043
V152	Cigarette Smoking	.07217	.011	-.110	.030
F18	Coworker Relations	.09316	.011	-.127	.013
V141	Number Supervised	.09556	.012	-.191	.000
V38	Work Group Involved in Establishing Goals	.11101	.015	.129	.013
V15	Aggressiveness (Type A/B)	.12414	.013	-.087	.091
V118	Organizational Stress	.13500	.011	.121	.032
V136	Months in Organiza- tion	.14331	.008	.108	.033
F15	Micro Supervision	.15280	.009	.143	.009
V92	Assignment w/o Resources	.16233	.010	.122	.028
V13	Breaks Make Manager	.17059	.008	-.093	.073
F19	Assertiveness	.17784	.007	.091	.086

Question 141 - "Number supervised," was directly related to both cortisol and perceived overall and perceived organizational stresses, but negatively related to cortisol. Once again, indicating as stress goes up, cortisol levels go down.

Most of the facets that were related to both cortisol and one of the perceived stress measurements did so in such a

manner as to indicate that as stress goes up, cortisol goes down. The exceptions to this were Question 13, an external locus of control question, and Question 92, receiving an assignment without adequate resources to accomplish it. These questions would indicate as stress is increased, cortisol levels are increased. This ambiguity has long been in evidence when dealing with cortisol in stress research. Mason (1965), in a review of psycho-endocrine research on the pituitary-adrenal system, summarized:

Psychological factors may either raise or lower the level of pituitary-adrenal cortical activity. Some important variables to consider in the relation of the 17-OHCS response are the quality of the emotional reaction, the style and the effectiveness of the psychological defenses, and whether the threat is of an acute or chronic nature. (p. 576)

Fye and Staton (1981) further summarized by stating that chronic stress may reduce cortisol levels while acute stress increases cortisol.

The new variables that were significant with cortisol are discussed. However, only the relationships will be reported due to the lack of historical data.

Factor 18 - Coworker Relations: This factor is negatively related to cortisol, indicating the better one's relationship with his/her peers, the lower the cortisol level. This is what would be expected if hostile peer relationships can be defined as acute stress.

Question 36 - "Total months in this organization is:" This question is directly related to cortisol levels. The more time an individual has in an organization, the higher

the cortisol level. This agrees with the results obtained by Fye and Staton (1981) through SAP I.

Question 137 - "Total months experience in present job:" This question was negatively related to cortisol levels, meaning the more experience in the job, the less the cortisol levels. Our results again agree with those found by Fye and Staton (1981).

Factor 15 - Micro Supervision: This factor was directly related to cortisol. Consequently, the more constricting an organization's policies and rules, the higher the cortisol levels. This, too, is as expected.

Question 95 - "I do not really have to worry about my output, it would be almost impossible for me to lose my job even if I only put in minimal effort." This statement is directly related to cortisol levels, indicating the more solidly entrenched an individual is in the job, the higher the cortisol level.

Question 38 - "To what extent is your work group involved in establishing goals?" This question was directly associated with cortisol levels. Consequently, the more an individual's work group is involved in establishing goals, the higher his/her cortisol level.

Question 152 - "How many cigarettes do you smoke per day?" The question is negatively related to cortisol levels. This would mean the more cigarettes a person smokes, the lower his/her cortisol levels.

Question 15 - "I enjoy the social interaction and

participation that comes with a game or event, and losing does not bother me at all." This statement typifies the Type B behavior pattern and is negatively associated with cortisol. Consequently, the more Type B behavior an individual exhibits, the lower the cortisol levels.

Perceived External Stress: Perceived External Stress was negatively associated with cortisol, which means as perceived external stress increases, cortisol decreases. As early research hypothesizes, chronic stress decreases cortisol levels. This again could reflect the idea that, for the most part, external stressors are chronic more than acute.

Perceived Organizational Stress: Perceived Organizational Stress had a direct relationship to cortisol. This only supports past research efforts if we assume that organizational stressors are primarily acute, which seems farfetched.

#### Research Question 6

What organizational, extraorganizational and individual facets are predictive of CHD potential (i.e., the ratio between total serum cholesterol and HDL cholesterol)? Table 16 summarizes the results of a regression run with the ratio of total cholesterol to HDL cholesterol as the dependent variable and the factors identified by factor analysis as the independent variables.

Table 17 summarizes the results of a regression that had a ratio of total cholesterol to HDL cholesterol for the dependent variable and the factors, and SAP II questions not included in the factors, as the independent variables.

TABLE 16

Regression Analysis Results  
 Dependent Variable: Ratio of Total Cholesterol  
 to HDL Cholesterol  
 Independent Variables: Factors

Factor	Facet	R <sup>2</sup>	Change in R <sup>2</sup>	Beta	Signifi- cance
25	Dietary Fat	.01885		.135	.011
4	Job Autonomy	.03240	.014	.152	.007
5	Planning Time	.04094	.009	-.100	.077

TABLE 17

Regression Analysis Results  
 Dependent Variable: Ratio of Total Cholesterol  
 to HDL Cholesterol  
 Independent Variables: Factors and SAP II Questions

Factor/ Variable	Facet	R <sup>2</sup>	Change in R <sup>2</sup>	Beta	Signifi- cance
V154	Height/Weight	.09806		.306	.000
V153	Cigar Smoking	.11858	.021	.149	.002
F25	Dietary Fat	.13568	.017	.144	.004
F15	Micro Supervision	.14830	.013	.101	.046
V10	What Happens is Usually Own Doing	.16019	.012	-.139	.006
V152	Cigarette Smoking	.16813	.008	.098	.045
V141	Number Supervised	.17612	.008	.129	.011
V13	Breaks Make Manager	.18518	.009	-.105	.037
F12	Job Enhancement	.19218	.007	-.218	.003
F4	Job Autonomy	.20388	.012	.110	.043
V42	Proud of Job	.21116	.007	.125	.078

The results of the regression remained the same when the independent variables were changed to the factors, the SAP II questions not included in the factors, perceived organizational stress, perceived external stress, and cortisol.

Discussion. Job Autonomy is one of the factors that was significant with perceived overall and organizational stresses and the ratio of total cholesterol to HDL cholesterol. However, it was negatively related to perceived overall stress and perceived organizational stress, and was directly related to the ratio of total cholesterol to HDL cholesterol. This relationship is somewhat obscure. It would be expected that as stress is increased, so does the cholesterol ratio. This would mean as total cholesterol increases while HDL cholesterol stays the same, the cholesterol ratio also increases. However, earlier regressions showed a negative relationship between Job Autonomy and perceived stress, thus reducing stress, which should reduce cholesterol levels.

Job Enhancement related to both perceived organizational stress and the cholesterol ratio, but again negatively to the ratio and directly to organizational stress. The negative relationship in the ratio is what would be expected only if the same negative relationship to perceived stress is present.

Other questions that were significant with stress and the cholesterol ratio were Questions 141 and 13. Both of these related with the cholesterol ratio in the same manner that they related to stress. Therefore, by reducing stress, the ratio was reduced, or by increasing stress, the ratio was increased, respectively, as would be expected.

Factor 15 - Micro Supervision was related in a direct manner to both cortisol and the cholesterol ratio. This would

make sense if one assumes micro supervision causes perceived stress, which in turn increases cholesterol and cortisol levels. Variable 152, cigarette smoking, also related significantly with both cortisol and cholesterol. However, with cortisol it had a negative relationship, and with the cholesterol ratio it had a direct relationship. This could be explained by the possibility that chronic smoking could actually affect the blood by increasing the cholesterol ratio while decreasing the cortisol level. Continuous smoking could act like chronic stress, exhausting the adrenocortical activity even though smoking is normally thought to have an acute relationship to cortisol. Another possibility is that smokers are stressed and this increases their cholesterol level. New variables affecting the cholesterol ratio are described below.

Factor 25 - Dietary Fat: This factor was directly related to the ratio of total cholesterol to HDL cholesterol. This would be expected, as total cholesterol would increase from eating high-fat foods.

Factor 5 - Planning Time: This factor negatively related to the cholesterol ratio. Consequently, the more time an individual has for planning, the less his/her cholesterol buildup.

Question 154 - Height and Weight: This factor directly related to the cholesterol ratio, meaning the heavier an individual's build, the higher the cholesterol ratio. This supports the findings of Fye and Staton (1981).

Question 153 - "If you smoke a pipe or cigar, you smoke



the following number of pipe bowls or cigars:" This question directly relates to the ratio of total cholesterol to HDL cholesterol, signifying the more a person smokes, the higher the ratio. This could be related in two ways: 1) smoking could actually reduce HDL cholesterol or increase cholesterol levels by chemical reactions with the blood; and 2) stressful people have a tendency to smoke more, and stress is believed to increase cholesterol levels.

Question 10 - "What happens to me is usually because of my own doing:" The more a person would agree with this statement, the more he/she would be internal locus of control. As this statement associates negatively with the ratio, it can be said that the more internal locus of control a person, the lower the cholesterol ratio.

Question 42 - "To what extent are you proud of your job?" This question is directly associated with the ratio of cholesterol to HDL cholesterol, indicating that people who are proud of their job have a higher ratio.

#### Research Question 7

What organizational, extraorganizational, and individual facets are predictive of perceived productivity? Table 18 summarizes the results of a regression having perceived productivity as the dependent variable and all the other factors as independent variables.

Table 19 summarizes the results of a regression with perceived productivity as the dependent variable and the factors and other SAP II questions as independent variables.

TABLE 18

Regression Analysis Results  
 Dependent Variable: Perceived Productivity  
 Independent Variables: All Other Factors

Factor	Facet	R <sup>2</sup>	Change in R <sup>2</sup>	Beta	Signifi- cance
14	Supervisory Control	.04106		.166	.002
7	Job Significance	.06284	.022	.133	.011
18	Coworker Relations	.07424	.011	.103	.049
5	Planning Time	.08137	.007	.085	.100

There were no changes in the regression when organizational stress, external stress, cortisol and the cholesterol ratio were brought into the equation.

Discussion. Usually the major goal of management is productivity. A major goal of this research effort is to link perceived productivity to personality traits, perceived stress, and certain health indicators. Table 20 is designed to give the reader the relationships discovered. It shows the "big picture," all the factors and variables that were significant with the six dependent variables.

The assumption is perceived productivity related to actual productivity in a direct manner. This indicates as perceived productivity goes up, so does productivity, and as perceived productivity goes down, productivity can be improved. With this in mind, each factor and question that proved significant with perceived productivity will be discussed in light of its relationship to stress and good health.

Factor 1 - Locus of Control: as previously stated, the

TABLE 19

Regression Analysis Results  
 Dependent Variable: Perceived Productivity  
 Independent Variables: Factors and SAP II Questions

Factor/ Variable	Facet	R <sup>2</sup>	Change in R <sup>2</sup>	Beta	Signifi- cance
V10	Locus of Control	.06825		.231	.000
V18	Time Urgency (Type A/B)	.11744	.049	-.251	.000
F14	Supervisory Control	.14963	.032	.148	.003
V136	Months in Organiza- tion	.16380	.014	.179	.000
F10	Group Goal Setting	.17756	.014	.149	.007
V26	Try to Do Too Much	.19026	.013	.211	.000
F2	Type A/B Behavior	.20771	.017	-.258	.000
F20	Community/Social Activity	.21889	.011	-.133	.008
V116	Fights for Social Acceptance	.22953	.011	-.122	.013
V93	Consulted on Decisions in Work Area	.23849	.009	.126	.023
V131	Frequency of Eating Eggs	.24806	.010	.110	.021
<hr/>					
	Age	.25530	.007	-.088	.084
F18	Coworker Relations	.26245	.007	.122	.013
F1	Locus of Control	.26889	.006	.123	.024
V41	Realistic Job Per- formance Goals	.27587	.007	.156	.004
V100	Job Security - Satisfaction	.28429	.008	-.078	.118
V15	Aggressiveness (Type A/B)	.29272	.008	-.109	.043
V82	Inadequate Time to Do Job	.29957	.007	.094	.057
F12	Job Enhancement	.30542	.006	-.100	.096

## Overall Regression Analysis Results

ES = External Stress OS = Organizational Stress S = Overall Stress  
C = Cortisol

more external locus of control oriented an individual, the higher the perceived stress. This same relationship holds true for perceived productivity. The possibility of stress going up to a certain level could improve performance. It is also interesting to note even though this personality trait is significant with stress, it is not significant physiologically.

Question 10 - "What happens to me is usually because of my own doing." This statement measures a person's internal locus of control motivation. It was directly related to productivity and negatively related to the cholesterol ratio, but not significantly related to stress. This would seem to indicate internal locus of control individuals improve productivity without the perceived stress of external locus of control individuals, as shown in Factor 1 above. At the same time, being internally locus of control motivated seems to have a significant affect on keeping the cholesterol ratio at lower levels, thus lessening the risk of loss to the firm through CHD.

Factor 2 - Type A/B Behavior Pattern: Table 20 shows this factor to be directly related to the three measurements of perceived stress, but negatively related to perceived productivity. This, of course, indicates Type A behavior individuals have higher stress levels and perceive their productivity needs improvement. There were no significant physiological relationships with the factor.

Question 15 - "I enjoy the social interaction and

participation that comes with a game or event, and losing does not bother me at all": and Question 18 - "I will not hurry myself, even when I know I'm late": These two Type B behavior questions are not significantly related to perceived stress, but are negatively related to productivity, meaning this behavior pattern also perceives their productivity could improve. In addition, Question 15 was significantly related to cortisol in a negative fashion, indicating significant perceived stress (this is indicated by other Type B questions being significantly related to perceived stress in a negative manner, i.e., Question 20) and lower cortisol levels.

Question 26 - "I frequently try to do too much, and as a result I feel tired most of the time." This statement, designed to measure Type A behavior, directly related to perceived overall stress and directly related to perceived productivity. In this case, the Type A individual has increased stress levels and perceives productivity as high. This is the only inconsistency in the Type A behavior pattern/productivity results; all the Type A questions perceived productivity as low.

Factor 5 - Planning Time has a direct effect on perceived productivity, and a negative effect on the cholesterol ratio. If the productivity assumption, higher perceived productivity indicates higher productivity, is correct, then management should employ the concept. By insuring employees have sufficient time to plan their activities, their productivity should increase and their risk of coronary heart disease

should decrease.

Factor 7 - Job Significance was related in a direct manner to perceived productivity, but did not relate significantly to perceived stress or to the physiological effects of stress. Consequently, if management can give employees significant jobs, they can increase productivity with no apparent risk of future health problems.

Goals were significantly related to perceived productivity in two different ways. Factor 10 - Goal Setting - and Question 14, "To what extent are your job performance goals realistic?" were directly related to perceived productivity. Consequently, if the employee's goals are realistic and he/she is also given a say in setting the organization's goals, productivity should increase. Since Question 41 is also negatively related to organizational stress, that increase in productivity results in less stress to the employee.

Factor 12 - Job Enhancement was negatively related to perceived productivity and the cholesterol ratio, and was directly related to perceived stress. People who are performing jobs which use their natural talents and training can often easily judge the productivity of an organization. Although they cannot always devise ways to improve the productivity, they can readily see when productivity is lacking.

Factor 14 - Supervisory Control was directly related to perceived overall stress, perceived external stress, and perceived productivity, but did not seem to significantly affect the employees physiologically. Although perceived stress

appear to have no adverse health effects, it does seem to be related to increased productivity. Under these circumstances, management can consider keeping such programs, but should carefully evaluate them periodically. This is because even if supervisory control doesn't appear to significantly affect a person's health, it could eventually do harm if other stressors are eliminated and it becomes more significant.

Factor 18 - Coworker Relations is a factor that directly affected perceived productivity and negatively affected the cortisol level, but had no significant relationship with perceived stress. This relationship is the type that management should pursue in all management programs, one that increases perceived productivity, while creating such an atmosphere as to lower cortisol levels.

Factor 20 - Community/Social Activity: This factor related to perceived productivity in a negative fashion, but had no significant relationship with stress or the physiological effects of stress. This would indicate the more community activities an individual participates in, the worse he/she perceives the organization's productivity. A possible explanation is that individuals who spend time in community affairs feel that they should be spending that time on the job.

Question 116 - "I am extremely frustrated by my fight for social acceptance away from the job." This question was negatively associated with productivity, but was directly associated with perceived overall, organizational and external stress. However, this question was not associated to the



physiological factors.

Question 93 - "I am consulted on decisions that affect my general work area." This statement was directly related to perceived productivity, but was not significantly related to stress or the physiological factors. Consequently, as an individual is consulted on decisions in his general work area, he/she perceives the productivity to improve.

Question 100 - Job Security was negatively related to perceived productivity, perceived overall stress, and perceived external stress. As previously discussed, the more job security, the less stress because people don't have to worry as much about losing their jobs. Some employees tend to use a secure job as an excuse to slack off on the amount of work they have to do. This action tends to multiply when other employees observe, and then decide to imitate this seemingly acceptable form of behavior. Eventually, this slower pace becomes the norm, having effectively decreased production in the long run.

Question 136 - Total Months in Organization was directly related to both production and cortisol, but was not significantly related to stress. This indicates the more time an individual has with the organization, the better he/she perceives that organization's productivity.

Age - Age was negatively related to both stress and perceived productivity. Therefore, the younger an employee, the better he/she sees productivity while experiencing less stress. One possible explanation is that older people,

remembering "the good old days," tend to compare the past with the present. They have their experience as well as the corporate memory to compare current production with.

Question 131 - "How often do you consume eggs?" This facet was directly related to perceived overall stress, perceived external stress and productivity. Eggs have already been related to Type A individuals and stress. Eggs can also be linked to productivity in the same manner. An individual, already having eaten a "good All American Breakfast" is ready to start work immediately upon reaching the work area. Another individual, not having eaten breakfast, might tend to grab for "that first cup of coffee" with production having to be put off while he/she drinks it.

#### Research Question 8

Are diagnosed CHD, blood pressure problems, ulcers, or frequent headaches related to perceived overall stress?

Table 21 summarizes a regression with overall stress as the dependent variable and diagnosed coronary heart disease, blood pressure problems, ulcers, or frequent headaches as independent variables.

Discussion. In relating health and stress-related diseases to stress, the following showed significance at the .10 level.

Frequent or Severe Headaches: This correlated in a direct manner with perceived overall stress, indicating that stressful people tend to get frequent or severe headaches.

TABLE 21

Regression Analysis Results  
 Dependent Variable: Overall Stress  
 Independent Variables: Stress-Related Illnesses

Illness	R <sup>2</sup>	Change in R <sup>2</sup>	Beta	Signifi- cance
Frequent/Severe Headaches	.03715		.174	.000
Diagnosed CHD	.04957	.012	-.124	.009
No Blood Pressure Problems	.05693	.007	-.088	.066

Diagnosed Coronary Heart Disease: This illness was negatively related to perceived overall stress. An explanation for this could be that people with diagnosed coronary heart disease are aware they shouldn't be stressed by their jobs for fear of a heart attack, so they concentrate on not worrying and use medication or other methods to keep their perceived stress from increasing.

No Blood Pressure Problem: This condition related to perceived overall stress in a negative manner. Thus, people indicating no problems with their blood pressure had low levels of stress. This would seem to illustrate that: 1) either blood pressure problems cause individuals stress by their knowing about it and having to cope with it; or 2) stress causes blood pressure problems, or both.

#### Research Question 9

Are diagnosed CHD, blood pressure problems, ulcers, or frequent headaches related to perceived organizational stress? Table 22 indicates the results of a regression having

organizational stress as the dependent variable and diagnosed coronary heart disease, ulcers, blood pressure problems, and frequent or severe headaches as the independent variables.

TABLE 22

Regression Analysis Results  
Dependent Variable: Organizational Stress  
Independent Variables: Stress-Related Illnesses

Illness	R <sup>2</sup>	Change in R <sup>2</sup>	Beta	Signifi- cance
Frequent/Severe Headaches	.03645		.176	.000
High Blood Pressure	.05220	.016	.137	.004
Diagnosed CHD	.05960	.007	-.087	.066

Discussion. Basically, the same illnesses relating to perceived overall stress also related to perceived organizational stress. The only exception was, instead of having no blood pressure problem correlating negatively, this time high blood pressure was significantly and directly related. This would seem to indicate anxiety caused by perceived organizational stress leads to high blood pressure.

#### Research Question 10

Are diagnosed CHD, blood pressure problems, ulcers, or frequent headaches related to perceived external stress? Table 23 summarizes the results of a regression with external stress as the dependent variable and diagnosed coronary heart disease, blood pressure problems, ulcers, and frequent or severe headaches as independent variables.

TABLE 23

Regression Analysis Results  
 Dependent Variable: External Stress  
 Independent Variables: Stress-Related Illnesses

Illness	R <sup>2</sup>	Change in R <sup>2</sup>	Beta	Signifi- cance
Frequent/Severe Headaches	.01997		.125	.010
Diagnosed CHD	.02860	.009	-.104	.029
No Blood Pressure Problems	.03474	.006	-.080	.097

Discussion. The regression results for perceived external stress were the same as for perceived overall stress.

#### Research Question 11

Are any of the enjoyment versus time ratios, as conceived by Dr. Troxler (1981), for family, friends, job, or hobbies predictive of perceived overall stress? Table 24 summarizes a regression with overall stress as the dependent variable and the four enjoyment versus time ratios as independent variables.

TABLE 24

Regression Analysis Results  
 Dependent Variable: Overall Stress  
 Independent Variables: Enjoyment versus Time Ratios

Ratio	R <sup>2</sup>	Change in R <sup>2</sup>	Beta	Signifi- cance
Friends	.02066		-.120	.045
Family	.03338	.013	-.115	.054

Discussion. In relating the enjoyment versus time ratios, the following proved significant:

Friends - As the ratio of the amount of enjoyment

received from being with friends to the amount of time spent with friends decreases, the amount of perceived overall stress increases. The Pearson's product-moment correlation coefficient,  $-.1479$ , was significant at the  $.008$  tolerance level. Seventy percent of the individuals answered the enjoyment portion (numerator) with one or two. Sixty percent of the participants answered the time portion with a one. This placed a large proportion of the score between  $1/1$  and  $2/1$ . In fact, the mean score for the Friends Ratio is  $1.320$  with a 95 percent confidence interval falling between  $1.232$  and  $1.407$ . This signifies that as the ratio increases, perceived stress is reduced.

Family: This ratio is negatively related to perceived overall stress. Therefore, as the ratio goes down, perceived stress goes up. The Pearson's product-moment correlation coefficient,  $-.1365$ , was significantly related at the  $.013$  tolerance level. Seventy percent of the individuals answered the enjoyment portion with a two, three, or four. Sixty-eight percent of the individuals answered the time portion of the question with a two, three or four, showing that, for the most part, the range should have been from  $.5$  to  $2.0$ . The mean score was  $1.207$  with the 95 percent confidence interval being from  $1.143$  to  $1.270$ . Essentially, as the ratio gets larger, stress increases.

#### Research Question 12

Are any of the enjoyment versus time ratios for family, friends, job, or hobbies predictive of organizational stress?

Table 25 summarizes the results of a regression having organizational stress as the dependent variable and the four enjoyment versus time ratios as independent variables.

TABLE 25

Regression Analysis Results  
Dependent Variable: Organizational Stress  
Independent Variables: Enjoyment versus Time Ratios

Ratio	R <sup>2</sup>	Change in R <sup>2</sup>	Beta	Signifi- cance
Job	.02000		-.136	.023

Discussion. The ratio of enjoyment received from the job to the time spent doing the job is the only ratio that significantly predicted organizational stress. The more an individual enjoys his/her job, in comparison to the time spent on the job, the higher the ratio and lower the stress. The Pearson's product-moment correlation coefficient was  $-.1468$ , and was significant at the .009 level. Sixty-six percent of the individuals answered the time portion of this ratio with a one or a two, and 69 percent answered the enjoyment portion of the job ratio with a two, three or four. The greatest proportion of answers should have been in the range from .5 to 4.0. The mean response was .840, with the 95 percent confidence interval being from .781 to .899. Twenty-five percent of the answers were between .91 and 1.05, while another 35 percent were between .46 and .75. Hence, the greater the time spent at the job, the lower the ratio and the higher the stress.

### Research Question 13

Are any of the enjoyment versus time ratios for family, friends, job, or hobbies predictive of perceived external stress? Table 26 gives the results of a regression utilizing external stress as the dependent variable and the four enjoyment ratios as independent variables.

TABLE 26

Regression Analysis Results  
Dependent Variable: External Stress  
Independent Variables: Enjoyment versus Time Ratios

Ratio	R <sup>2</sup>	Change in R <sup>2</sup>	Beta	Signifi- cance
Family	.03800		-.170	.004
Friends	.05175	.014	-.120	.043

Discussion. The same ratios, those of family and friends, that were significant with perceived overall stress were also significant with perceived external stress. This indicates the more an individual enjoys his/her family and friends, in comparison with the time spent with them, the higher the ratios and lower the stress levels. The Pearson's product-moment correlation coefficient was  $-.1752$ , with  $.002$  significance and  $-.1460$  with  $.009$  significance for family and friends ratios, respectively.

### Research Question 14

Are any of the enjoyment versus time ratios for family, friends, job, or hobbies predictive of physical stress (i.e., cortisol levels)? In the regression with cortisol as the



dependent variable and the enjoyment versus time ratios as independent variables, none of the ratios were significant below the .60 tolerance level.

#### Research Question 15

Are any of the enjoyment versus time ratios for family, friends, job, or hobbies predictive of coronary heart disease (i.e., the ratio of total cholesterol to HDL cholesterol)? In the regression with productivity as the dependent variable and the enjoyment versus time ratios as independent variables, none of the variables came in significant at the .10 tolerance level.

#### Research Question 16

Are any of the enjoyment versus time ratios for family, friends, job or hobbies predictive of perceived productivity? Table 27 gives the results of a regression having the ratio of total cholesterol to HDL cholesterol as the dependent variable and the four enjoyment versus time ratios as independent variables.

TABLE 27

Regression Analysis Results  
Dependent Variable: Perceived Productivity  
Independent Variables: Enjoyment versus Time Ratios

Ratio	R <sup>2</sup>	Change in R <sup>2</sup>	Beta	Signifi- cance
Job	.014		-.109	.025

Discussion. The enjoyment versus time ratio for an individual's job was directly related to perceived

productivity. Therefore, as the ratio of the individual's enjoyment in the job, in comparison to the time spent on the job, increases, the perceived productivity also increases.

## CHAPTER IV

### SUMMARY AND CONCLUSIONS

#### Summary

This research effort was directed towards identifying various stressors and behavior patterns affecting stress. These were analyzed and then linked to perceived productivity and physiological health indices.

Table 20 provides a ready reference on the overall results, which include all the factors and variables that were significant with the six dependent variables. As shown on this table, it is evident that the type of person most likely to contract coronary heart disease (i.e., has an abnormally high ratio between total cholesterol and HDL cholesterol) is overweight, has a high fat diet, and smokes either cigarettes, cigars, pipes, or all three. He/she would likely be a supervisor. In fact, the more people the individual supervises, the better the chances of developing a coronary heart disease.

However, it would be difficult to state categorically the type of person that would be affected physically by stress or the type of stressor that would affect a person physiologically due to the ambiguity of the physical stress (i.e., cortisol) results and the lack of consistency in past research efforts. While it certainly is not considered uncommon to

to find vague results in stress studies, perhaps the chronic/acute relationship can explain the results yielded by this research effort. If one can assume that most of the stress perceived by the SAP II participants was chronic due to the nature of obtaining the samples (volunteers at a stress seminar), it would explain why almost all the items that related to both perceived stress and physical stress related in opposite directions (i.e., when a facet related directly to perceived stress, it related inversely to physical stress, and vice versa). Although this tends to explain the results, further research would have to be performed in order to prove this assumption.

The results show that Type A individuals, with external locus of control tendencies, who have a low tolerance for change, generally perceive the most stress. They tend to be unassertive, young adults and, based on the population utilized, are probably striving to establish themselves within their organizations. The individuals with high perceived external stress very likely have high organizational stress, while those with high perceived organizational stress are also likely to have perceived external stress. The individuals having higher levels of perceived stress normally work in an organization where they perceive a high level of productivity. This perhaps adds to their levels of perceived stress because these people would tend to strive to improve, or sustain, that productivity. The results also show that individuals who perceive productivity as high tend to be externally locus of control

motivated. They probably have a Type B behavior pattern, after all, the ambitiousness and aggressive nature of the Type A person would always be seeking improvement. The employees who have time to plan their goals and who also have the opportunity to input their opinions on their activities will perceive productivity as higher. Curiously, job enhancement seems to decrease an employee's perception of the organization's productivity, while employees subject to strong supervisory control tend to perceive productivity as high.

This questionnaire was used across a general population, with no job-type restrictions, in order to extract general information. This could have caused some regression ambiguity (i.e., both Type A and B behavior positively related to perceived stress in the same regression). The reader is also cautioned against taking the tentative explanations of stress and productivity too literally. Only a relatively small percentage of the stress and productivity variance was accounted for by the predictors. Other factors could have a moderating effect on the existing predictors, or might increase the overall variance accounted for by the criteria.

### Conclusions

SAP II Management Applications. A modified SAP II could be effectively utilized by management as a tool to identify whether or not organizational stressors are beneficial. Behaviorists have long recognized that tension produces a heightening of awareness that aids people to perform better. However,

there is an optimal stress level. If an individual goes beyond this level, he/she will be less productive; or, if an individual does not reach that level, he/she will probably not reach their peak performance (Forbes, 1979). Under these circumstances, management could keep performance at a peak by optimizing stress levels. For example, Table 20 illustrates that factor 5, Planning Time, appears to have the effect of increasing productivity, while at this same time decreasing the cholesterol ratio in the individual. As both productivity and good health are desired outcomes for the organization, management could attempt to implement programs to give employees time to plan their activities.

However, before SAP II could be used in such a manner, greater control would have to be exercised in selecting the sample, as stressors for sewing machine operations in a garment factory are different than stressors for guards at a high security prison. The ability to link stress, health, and productivity within an organization would be extremely valuable, as it would allow managers to evaluate their programs in regards to productivity and physical and mental health. Finally, SAP II would also give managers a better idea of the right personality types for the job. Personality tests could also be used in the job selection process. Obviously, certain personality types are better for some jobs than for others.

The end result is that SAP II, if properly modified and used, could be a valuable tool to aid management in setting up a program designed to get maximum productivity, by

insuring the right personality types are performing the job, and the stressors inherent with any organization are not detrimental to productivity or good health.

Enjoyment Versus Time Ratios. In regards to the enjoyment versus time ratios, Dr. Troxler's theory that the ratios have a significant relationship with perceived stress has been verified. The relationship appears to be based on a one-to-one ratio of enjoyment from an activity, to time spent in that activity. Consider, for instance, the mean of the four ratios: job - .840, family - 1.207, friends - 1.320, and hobbies - 1.344. This is based on the concept that people spend the most time possible in activities they enjoy and the least time in doing things they don't enjoy. The ideal is that people will spend more time in activities they enjoy. Realistically, this should lower the ratios as the denominator is increased by spending more time in the activity. This, however, could be misleading. For instance, if an individual could only spend a minimal amount of time in pursuit of a somewhat enjoyable activity, a sample ratio of 4 to 20, or 2.00, would tend to result. If another individual cannot devote time to an activity he/she enjoys tremendously, the sample ratio of 7 to 1, or 7 would result. The hypothesis would seem to indicate that the first individual has more stress due to the lower value and the negative relationship.

Regardless of the previously stated imperfections, significant relationships have been found that should be explored. Research is required, using the ratios as dependent

variables, to find out what makes them fluctuate (i.e., what activities make work or homelife ratios increase, thus reduce perceived stress). Perhaps as more research is completed in this area, new breakthroughs will occur in stress research.

Tolerance for Change. It is evident that every individual has his/her own special way to cope with the environment. "The responses of the individual to persons and things are shaped by the way they look at him [/her]--his [/her] cognitive world." (Krech, Crutchfield and Ballachey, 1962, p. 17) A person's individualized view on life is influenced by the social environment, goals and actual physiological make-up. He/she selectively organizes ideas about the environment, only taking those that fit his/her conception of the way things should be. Some of these new experiences, of course, have different characteristics and do not fit the mold exactly. The individual can handle this "disturbance" by choosing to distort the situation, forcing it to conform to prior expectations or can accept it by adapting to the new idea. How an individual analyzes, and then copes with, the environment is recognized as an important means of understanding stress and coping (Kutash, Schlesinger & Associates, 1980).

Frenkel-Brunswik proposed, in 1949, that some people find it difficult to tolerate and effectively manage ambiguities, inconsistencies, and surprises (Krech, Crutchfield, & Ballachey, 1962). This concept, called intolerance of ambiguity, suggests that people who cannot tolerate ambiguity relatively reject new information which would increase the



multiplexity of their cognitive system. These people have a tendency to dichotomize the world into things, and people are either all good or all bad. As a result, when these individuals are faced with an ambiguous problem, they quickly resort to one "perfect" solution. Routine is preferred by these people and ambiguity is kept to a minimum. They feel safe and secure because they already know, and can therefore anticipate, the answer. Change is to be avoided, lest it interfere with the smooth, already proven operation of the system. This is one extreme. Other people, of course, adapt very well and might even thrive on the challenge of facing the unknown.

A new concept derived from this research effort is that every individual has a unique quality called tolerance for change. Tolerance for change acts as a moderating variable much like locus of control, assertiveness or Type A/B behavior. However, it further modifies the expected emotional and physiological responses normally expected of these personality types, as shown by Figure 1.

This concept could explain the wide divergence of stress perceived by various individuals taking the Holmes-Rahe Social Readjustment Rating Scale (SRRS) on the same life events, as previously discussed in the literature review. An individual with a high tolerance for change would perceive the different life events as less stressful and, in some cases, almost welcome a break in routine. Likewise, an individual with a low tolerance for change would find more stress for

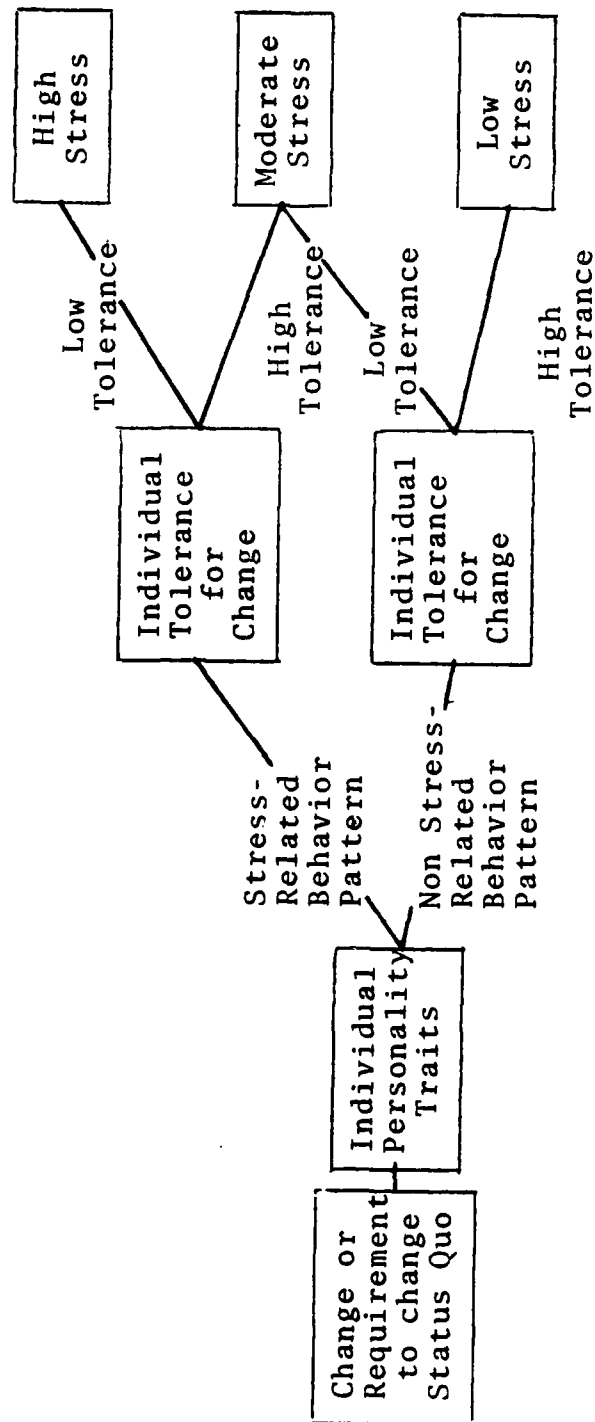


Fig 1. Tolerance for Change Model of Perceived Stress

any of the major life events, which by definition result in a change to his/her environment. Tolerance for change could be utilized as a factor to identify why some people view items as stressful, while others do not.

Future research is highly recommended in this area. It could easily be quantified, making stress research more exact and predictable. A Tolerance for Change Index Questionnaire could be developed by listing the different life events for people to evaluate. They would assign a score to each event, according to their perceived stress, by using a 3-point scale (i.e., not stressful, moderately stressful, or highly stressful). A weight, perhaps the same one used by the SRRS, could be assigned to indicate whether the item is a major life change, requiring major adjustments, or a minor change. Another weight, between .50 and 1.00, should be incorporated to indicate whether the individual's perceived stress is based on expected outcome or actual experience. The .50 weight would be used if the response was based on "gut feeling," the .75 weight for a similar experience, and the 1.00 weight for the reoccurrence of an event.

For example, if an individual were to evaluate marriage as a highly stressful event, he/she would probably give it a score of 3. As it is considered to be a major adjustment, the SRRS assigns a weight of fifty. However, because he/she is basing his/her perception on "gut feeling," the overall score for this event is 75. The same process would be done over many different events. The scores would then be added

together to get a sum total of tolerance for change. This score could also be correlated with perceived stress for further testing. If this theory is correct, the correlation will tend to be extremely high.

Final Remarks. Stress and anxiety are clearly a pervasive part of current life styles, perhaps more so in today's complex world than ever before. Hans Sielye has stated, "We are exposed to stress every moment of our lives, and our response to it often determines the quality of our life and health." (Kurash, Schlesinger & Associates, 1980, p. 127)

Stress cannot be avoided. People are constantly required to expend energy to meet the countless demands of life. Unfortunately, the most closely CHD related behavior pattern is the one management admires, encourages and rewards in today's competitive business world (Dehart, 1978). Management will have to reconstruct its philosophy in order to reduce organizational stress, which is a major risk factor in coronary heart disease. Since there is no way to completely eliminate stress, future research efforts should be directed towards medically stabilizing the physiological effects of stress rather than trying to eliminate it completely by management. Research needs to determine exactly what happens to the body when an individual perceives stress and then must find ways to neutralize these effects. When this has been accomplished, the desired outcome, maximizing individual worth while minimizing individual health hazards, will have been fully realized.

Ultimately, responsibility rests with the individual. Each person should become involved in his/her own program, whether it be on an individual, national or global scale. The world is constantly striving for peace and tranquility. This constitute a universal need, therefore, all must contribute to its achievement. It can eventually be realized through people working together.

APPENDIX A  
STRESS ASSESSMENT PACKAGE

## Section 1: PERSONAL BELIEFS

### Instructions

This portion of the questionnaire relates the way in which certain important events in our society affect different people. Each item consists of a pair of alternatives numbered 1 or 2. Using the scale below, indicate which statement most closely follows your own beliefs and record it on your answer sheet.

- 1 = I strongly agree more with statement 1
- 2 = I moderately agree more with statement 1
- 3 = I slightly agree more with statement 1
- 4 = I slightly agree more with statement 2
- 5 = I moderately agree more with statement 2
- 6 = I strongly agree more with statement 2

1. 1 Usually people get the respect they deserve in this world.  
2 An individual's worth often passes unrecognized no matter how hard he/she tries.

MEAN RESPONSE - 2.820

2. 1 The idea that teachers are unfair to students is nonsense.  
2 Most student's don't realize the extent to which their grades are influenced by accidental happenings.

MEAN RESPONSE - 3.3113

3. 1 Becoming a success is a matter of hard work; luck has little or nothing to do with it.  
2 Getting a good job depends mainly on being in the right place at the right time.

MEAN RESPONSE - 2.954

4. 1 Most citizens can have an influence in government decisions.  
2 This world is run by the few people in power, and there is not much the little guy can do about it.

MEAN RESPONSE - 3.429

5. 1 For me, getting what I want has little or nothing to do with luck.  
2 Many times we might just as well decide what to do by flipping a coin.

MEAN RESPONSE - 2.108

6. 1 Getting people to do the right thing depends upon ability; luck has little or nothing to do with it.  
2 Who gets to be the boss often depends on who was lucky enough to be in the right place first.

MEAN RESPONSE - 2.302

7. 1 There is really no such thing as luck.  
2 Most people don't realize the extent to which their lives are controlled by accidental happenings.

MEAN RESPONSE - 3.776

8. 1 It is impossible for me to believe that chance or luck plays an important role in my life.  
2 Many times I feel that I have little influence over the things that happen to me.

MEAN RESPONSE - 3.217

9. 1 What happens to me is my own doing.  
2 Sometimes I feel that I don't have enough control over the direction my life is taking.

MEAN RESPONSE - 2.160

## PART II

Indicate your agreement with the statement below using the following scale:

NA = Not applicable	4 = Neither Agree nor Disagree
1 = Strongly Disagree	5 = Slightly Agree
2 = Moderately Disagree	6 = Moderately Agree
3 = Slightly Disagree	7 = Strongly Agree

10. What happens to me is usually of my own doing.

MEAN RESPONSE - 5.645

11. I frequently feel that in dealing with life situations I might do just as well if I flipped a coin.

MEAN RESPONSE - 2.197

12. Generally speaking, there really is no such thing as luck.

MEAN RESPONSE - 3.668

13. Without the right breaks one cannot become effective as a manager.

MEAN RESPONSE - 2.716

14. Usually, individuals have misfortunes due to their own mistakes.

MEAN RESPONSE - 4.977



## Section 2: PERSONAL ATTRIBUTES

### Instructions

The next set of questions is concerned with your personal attributes. Each item consists of five alternatives. Select the alternative that is the most descriptive of you as an individual. Please record your answer on the answer sheet.

15. 1 Winning is everything; my satisfaction comes from winning.  
2 I like winning any game or event, and am very disappointed when I lose.  
3 I like winning any game or event, and am somewhat disappointed when I lose.  
4 I like winning any game or event, but I equally enjoy interaction and participation.  
5 I enjoy the social interaction and participation that comes with a game or event, and losing does not bother me at all.

MEAN RESPONSE - 3.507

16. 1 I do my very best when I'm fighting a tight deadline.  
2 I seem to do my best work when I have a reasonable deadline to meet.  
3 I work equally well whether I have a deadline to meet or not.  
4 Although I perform adequately with a deadline to meet, I prefer to not meet a deadline.  
5 I do not like deadlines; I do my best work when I'm not hurried in any manner.

MEAN RESPONSE - 2.545

17. 1 I hate to wait on anything or anybody.  
2 I do not enjoy waiting but I will if I absolutely have to.  
3 Although I don't really enjoy waiting, I don't mind if I don't have to wait too long.  
4 I don't mind waiting; there are many situations where one must wait.  
5 Waiting on something or someone is a pleasant opportunity to relax.

MEAN RESPONSE - 2.608

18. 1 I am always in a rush, even when I don't have to be.  
2 Most of the time I'm in a hurry, even when I don't have to be.  
3 I occasionally find myself in a hurry, even though most of the time I don't have to.  
4 I seldom hurry myself; only when I have to.  
5 I will not hurry myself, even when I know I'm late.

MEAN RESPONSE - 2.760

19. 1 I always try to do too much, as a result I always feel tired.  
2 I frequently try to do too much, and as a result I feel tired most of the time.  
3 On rare occasions I find myself trying to do too much; when these occasions arise, I slow down.  
4 I pace myself in accomplishing tasks so that they are all accomplished with the minimum amount of fatigue.  
5 I will not overextend myself, even if it means not getting something done.

MEAN RESPONSE - 2.568

20. 1 I set very high work standards for myself, and get very upset when I don't meet them.  
2 I set high work standards for myself, and get upset when I don't meet them.  
3 I set my own work standards, and it bothers me somewhat if I don't meet them.  
4 I set work standards for myself, and it bothers me to a little extent if I don't meet them.  
5 I maintain work standards that I can make without overextending myself, and I do not get upset if I occasionally fail.

MEAN RESPONSE - 2.438

## PART II

### Instructions

Indicate your agreement with the statement by selecting the response option which best represents your attitude concerning your personal attributes.

NA = Not Applicable	4 = Neither Agree nor Disagree
1 = Strongly Disagree	5 = Slightly Agree
2 = Moderately Disagree	6 = Moderately Agree
3 = Slightly Disagree	7 = Strongly Agree

21. I like winning any game or event, and I am very disappointed if I lose.

MEAN RESPONSE - 4.039

22. I hate to wait on anything or anybody.

MEAN RESPONSE - 4.426

23. I am frequently in a hurry, even when I don't have to be.

MEAN RESPONSE - 4.557

24. I frequently get upset with people, but I usually do not show it.

MEAN RESPONSE - 3.794

25. I set high work standards for myself, and get upset when I don't meet them.

MEAN RESPONSE - 5.051

26. I frequently try to do too much, and as a result I feel tired most of the time.

MEAN RESPONSE - 4.312

27. I eat fast, because sometimes I feel that I could put the time I spend eating to better use.

MEAN RESPONSE - 3.367

28. I frequently get irritated when a person takes too long in making his/her point in a normal conversation.

MEAN RESPONSE - 4.866

29. I get agitated when someone is late in meeting with me.

MEAN RESPONSE - 5.090

### Section 3: PERCEIVED PRODUCTIVITY

#### Instructions

The statements below deal with the output of your group. For some jobs certain statements may not be applicable. Should this be the case for your work group, then you should select the not applicable statement coded "NA" below. Indicate your agreement with the statement by selecting the answer which best represents your attitude concerning your work group.

NA = Not Applicable	4 = Neither Agree nor Disagree
1 = Strongly Disagree	5 = Slightly Agree
2 = Moderately Disagree	6 = Moderately Agree
3 = Slightly Disagree	7 = Strongly Agree

30. The quality of output of your work group is very high.

MEAN RESPONSE - 5.802

31. When high priority work arises, such as short suspenses, crash programs, and schedule changes, the people in my work group do an outstanding job in handling these situations.

MEAN RESPONSE - 5.887

32. Your work group's performance in comparison to similar work groups is very high.

MEAN RESPONSE - 5.871

33. The quality of output of your work group is very high.

MEAN RESPONSE - 5.583

#### Section 4: JOB INVENTORY

##### Instructions

Below are items which relate to your job. Read each statement carefully and then decide to what extent the statement is true of your job. Indicate the extent that the statement is true for your job by choosing the statement below which best represents your job.

- |                             |                              |
|-----------------------------|------------------------------|
| 1 = Not at all              | 5 = To a fairly large extent |
| 2 = To a very little extent | 6 = To a great extent        |
| 3 = To a little extent      | 7 = To a very great extent   |
| 4 = To a moderate extent    |                              |

Select the corresponding number for each question and enter it on the separate answer sheet.

34. To what extent does your job provide a great deal of freedom and independence in scheduling your work and selecting your own procedures to accomplish it?

MEAN RESPONSE - 4.764

35. To what extent does your job give you freedom to do your work as you see fit?

MEAN RESPONSE - 4.760

36. To what extent do you use your time for weekly or monthly planning?

MEAN RESPONSE - 3.481

37. To what extent do you use your time for daily planning?

MEAN RESPONSE - 3.627

38. To what extent is your work group involved in establishing goals?

MEAN RESPONSE - 3.819

39. To what extent is there conflict between your work group and another work group in your organization?

MEAN RESPONSE - 3.303

40. To what extent is there conflict between your organization and another organization with which you have some work-related dealings?

MEAN RESPONSE - 3.019

41. To what extent are your job performance goals realistic?  
MEAN RESPONSE - 4.984
42. To what extent are you proud of your job?  
MEAN RESPONSE - 5.307
43. To what extent does your job give you a feeling of pride and self-worth?  
MEAN RESPONSE - 4.945
44. To what extent does doing your job well affect a lot of people?  
MEAN RESPONSE - 5.487
45. To what extent is your job significant, in that it affects others in some important way?  
MEAN RESPONSE - 5.510
46. To what extent is your work group involved in establishing goals?  
MEAN RESPONSE - 3.886
47. To what extent are your job performance goals clear and specific?  
MEAN RESPONSE - 4.495
48. To what extent do you know exactly what is expected of you in performing your job?  
MEAN RESPONSE - 4.901
49. To what extent would you like to have the opportunity for personal growth in your job?  
MEAN RESPONSE - 6.051
50. To what extent would you like to have the opportunity to use your skills in your job?  
MEAN RESPONSE - 6.244
51. To what extent would you like to have the opportunity to perform a variety of tasks in your job?  
MEAN RESPONSE - 5.986
52. To what extent are the requirements placed on you in your job in line with your interests and values?  
MEAN RESPONSE - 4.583
53. To what extent does your present job fulfill your expectations of what a good job involves?  
MEAN RESPONSE - 4.553

54. To what extent does your job require communication between workers?  
MEAN RESPONSE - 5.912
55. To what extent are group meetings used to solve problems and establish goals and objectives within your work group?  
MEAN RESPONSE - 3.863
56. To what extent does your job provide you with the opportunity to accomplish something worthwhile?  
MEAN RESPONSE - 4.901
57. To what extent does your job enable you to use your natural talents?  
MEAN RESPONSE - 4.745
58. To what extent does your job utilize your training for that job?  
MEAN RESPONSE - 5.021
59. To what extent are you allowed to provide ideas for solving job related problems?  
MEAN RESPONSE - 4.942
60. To what extent are your ideas utilized in solving job related problems?  
MEAN RESPONSE - 4.514
61. To what extent does your job provide you with the chance to finish completely the piece of work you have begun?  
MEAN RESPONSE - 5.143
62. To what extent does your job require you to do many different things, using a variety of your talents and skills?  
MEAN RESPONSE - 5.067
63. To what extent does your job provide the chance to know for yourself when you do a good job, and to be responsible for your own work?  
MEAN RESPONSE - 5.210

## Section 5: SUPERVISOR INVENTORY

### Instructions

The statements below describe characteristics of managers or supervisors. Indicate your agreement by choosing the statement below which best represents your attitude concerning your supervisor.

NA = Not Applicable	4 = Neither Agree nor Disagree
1 = Strongly Disagree	5 = Slightly Agree
2 = Moderately Disagree	6 = Moderately Agree
3 = Slightly Disagree	7 = Strongly Agree

Select the corresponding number and mark your answer on the separate answer sheet.

64. My supervisor is a good planner.  
MEAN RESPONSE - 4.753
65. My supervisor represents the group at all times.  
MEAN RESPONSE - 4.740
66. My supervisor establishes good work procedures.  
MEAN RESPONSE - 4.612
67. My supervisor has made his/her responsibilities clear to the group.  
MEAN RESPONSE - 4.801
68. My supervisor performs well under pressure.  
MEAN RESPONSE - 4.791
69. My supervisor always helps me improve my performance.  
MEAN RESPONSE - 4.374
70. My job performance has improved due to feedback received from my supervisor.  
MEAN RESPONSE - 4.261
71. My supervisor frequently gives me feedback on how well I am doing my job.  
MEAN RESPONSE - 3.951
72. My relationship with my supervisor is a good one.  
MEAN RESPONSE - 5.579
73. My supervisor is cooperative.  
MEAN RESPONSE - 5.510
74. My supervisor is supportive of the people who work for him/her.  
MEAN RESPONSE - 5.394
75. My supervisor provides close control and firm direction.  
MEAN RESPONSE - 4.225

76. My supervisor sets procedures and work to be done.  
MEAN RESPONSE - 4.456
77. My supervisor spends too much time in minor details.  
MEAN RESPONSE - 3.729
78. My supervisor requires paperwork that is not needed for the job.  
MEAN RESPONSE - 3.205

## Section 6: ORGANIZATION CLIMATE INVENTORY

### Instructions

Below are items which describe characteristics of your organization. Indicate your agreement by choosing the statement below which best represents your opinion concerning your organization.

NA = Not Applicable	4 = Neither Agree nor Disagree
1 = Strongly Disagree	5 = Slightly Agree
2 = Moderately Disagree	6 = Moderately Agree
3 = Slightly Disagree	7 = Strongly Agree

79. Your organization is very interested in the attitudes of the group members toward their jobs.  
MEAN RESPONSE - 4.180
80. Your organization has a very strong interest in the welfare of its people.  
MEAN RESPONSE - 4.400
81. I am very proud to work for this organization.  
MEAN RESPONSE - 5.145
82. I could produce a higher quality product, if I only had more time.  
MEAN RESPONSE - 4.301
83. This organization rewards individuals based on performance.  
MEAN RESPONSE - 4.258
84. I am uncertain I will still have a job with this organization in the future.  
MEAN RESPONSE - 3.294
85. People equal to or above my supervisor's position give me tasks without going through my supervisor.  
MEAN RESPONSE - 3.373



86. There are far too many policies and regulations con-  
stricting my effective job performance.  
MEAN RESPONSE - 3.439
87. I could do my job better if the organization had fewer  
rules.  
MEAN RESPONSE - 3.341
88. My relationship with my peers is a good one.  
MEAN RESPONSE - 6.134
89. There are very few disagreements or conflicts between  
myself and my co-workers.  
MEAN RESPONSE - 5.847
90. I have to do things that should be done differently.  
MEAN RESPONSE - 4.193
91. I work on unnecessary things.  
MEAN RESPONSE - 3.671
92. I receive an assignment without adequate resources and  
materials to execute it.  
MEAN RESPONSE - 3.379
93. I am consulted on decisions that affect my general work  
area.  
MEAN RESPONSE - 4.698
94. I am just a pawn, subject to the whims of personnel  
above me.  
MEAN RESPONSE - 3.156
95. I do not really have to worry about my output, it would  
be almost impossible for me to lose my job even if I  
only put in minimal effort.  
MEAN RESPONSE - 2.438

## Section 7: JOB SATISFACTION QUESTIONNAIRE

### Instructions

The items below relate to your job or the Air Force as a pro-  
fession. Indicate how satisfied or dissatisfied you are with  
each item. Choose the statement below which best describes  
your degree of satisfaction or dissatisfaction.

NA = Not applicable                      4 = Neither satisfied nor dissatisfied  
 1 = Extremely dissatisfied    5 = Slightly satisfied  
 2 = Moderately dissatisfied   6 = Moderately satisfied  
 3 = Slightly dissatisfied    7 = Extremely satisfied

96. Progression Opportunities: The chance to rise up the ladder to upper level management positions.

MEAN RESPONSE - 3.950

97. Feeling of Helpfulness: The chance to help people and improve their welfare through the performance of your job.

MEAN RESPONSE - 5.241

98. Family Attitude Toward Job: The recognition and the pride your family has in the work you do.

MEAN RESPONSE - 5.368

99. Work Itself: The challenge, interest, importance, variety, and feelings of accomplishment you receive from your work.

MEAN RESPONSE - 5.192

100. Job Security

MEAN RESPONSE - 5.673

101. Acquired Valuable Skills: The chance to acquire valuable skills in your job which prepare you for future opportunities.

MEAN RESPONSE - 4.887

102. Your Job as a Whole

MEAN RESPONSE - 5.164

## Section 8: ASSERTIVENESS INVENTORY

### Instructions

The following questions will attempt to measure your level of assertiveness. Indicate your agreement with the statement by selecting the answer which best represents your opinion.

1 = Not at all                      5 = To a fairly large extent  
 2 = To a very little extent    6 = To a great extent  
 3 = To a little extent        7 = To a very great extent  
 4 = To a moderate extent

103. To what extent do you call it to his/her attention when a person is highly unfair?

MEAN RESPONSE - 4.463

104. To what extent do you speak out or protest when someone takes your place in line?

MEAN RESPONSE - 4.095

105. To what extent do you call attention to the situation in which a latecomer is waited on before you?

MEAN RESPONSE - 4.014

106. To what extent do you insist that your landlord (mechanic, repairman, etc.) make repairs that are his/her responsibility to make?

MEAN RESPONSE - 5.000

107. To what extent are you able to speak up for your viewpoint when you differ with a person you respect?

MEAN RESPONSE - 5.152

## Section 9: SOCIAL ENVIRONMENT INVENTORY

### Instructions

The items below relate to your social life away from your job. Indicate how much you agree/disagree with each item. Choose the statement below which best describes your degree of agreement.

NA = Not Applicable	4 = Neither agree nor disagree
1 = Strongly disagree	5 = Slightly agree
2 = Moderately disagree	6 = Moderately agree
3 = Slightly disagree	7 = Strongly agree

108. I am extremely well known in my community, and am well respected for my contributions.

MEAN RESPONSE - 3.270

109. I am extremely involved in social activities outside my job.

MEAN RESPONSE - 3.290

110. I am frequently asked to contribute time and effort in community projects.

MEAN RESPONSE - 3.141

111. I have several hobbies and/or interests apart from work.

MEAN RESPONSE - 5.448

112. I lead an active fulfilling social life.

MEAN RESPONSE - 4.328

113. I find satisfaction in doing something I enjoy.

MEAN RESPONSE - 6.636

114. I often find that my involvement in community affairs interferes with time would be better off spending on my job.

MEAN RESPONSE - 2.467

115. I feel guilty when I'm not working on furthering my career.

MEAN RESPONSE - 3.425

#### Section 10: PERCEIVED STRESS

This portion of the questionnaire relates primarily to the extent to which you perceive yourself as under stress and to what you consider the prime contributor. Using the scale below indicate the extent to which you agree with the statement.

NA = Not Applicable

1 = Strongly Disagree

2 = Moderately Disagree

3 = Slightly Disagree

4 = Neither Agree nor Disagree

5 = Slightly Agree

6 = Moderately Agree

7 = Strongly Agree

116. I am extremely frustrated by my fight for social acceptance away from the job.

MEAN RESPONSE - 2.000

117. I feel highly tense because I can't seem to progress in my job.

MEAN RESPONSE - 3.067

118. I feel a great deal of stress and anxiety in the performance of my job.

MEAN RESPONSE - 4.081

119. My unfulfilled homelife greatly adds to my frustration.

MEAN RESPONSE - 2.840

120. My lifestyle away from my job is extremely tense and stressful.

MEAN RESPONSE - 2.619

121. I must admit that it makes me angry when other people interfere with my daily activity.

MEAN RESPONSE - 3.876

122. I find that a well-ordered mode of life with regular hours is congenial to my temperament.  
MEAN RESPONSE - 4.947
123. It bothers me when something interrupts my daily routine.  
MEAN RESPONSE - 4.009
124. I don't like to undertake any project unless I have a pretty good idea as to how it will turn out.  
MEAN RESPONSE - 3.718
125. I find it hard to set aside a task that I have undertaken, even for a short time.  
MEAN RESPONSE - 3.910

### Section 11: FAMILY INVENTORY

#### Instructions

Indicate your agreement with the statement by selecting the answer which best represents your opinion.

- |                             |                              |
|-----------------------------|------------------------------|
| 1 = Not at all              | 5 = To a fairly large extent |
| 2 = To a very little extent | 6 = To a great extent        |
| 3 = To a little extent      | 7 = To a very great extent   |
| 4 = To a moderate extent    |                              |

126. To what extent are things going well between you and your wife/husband?  
MEAN RESPONSE - 5.228
127. To what extent are there negative feelings between you and your wife/husband when you are together?  
MEAN RESPONSE - 2.767
128. To what extent are you satisfied with your family life?  
MEAN RESPONSE - 5.012
129. To what extent is your relationship with your spouse a good one?  
MEAN RESPONSE - 5.373
130. To what extent do you and your wife/husband enjoy your time together?  
MEAN RESPONSE - 5.209

## Section 12: FOOD CONSUMPTION INVENTORY

### Instructions

Use the scale below to answer the questions for this section.

NA = Never consume (eat or drink) the item(s)

1 = 2-3 times each month (or less)

5 = 6-8 times each week

2 = Once each week

6 = 9-11 times each week

3 = 2-3 times each week

7 = 12 or more times a week

4 = 4-5 times each week

How many times do you consume the following food items?

131. Eggs

MEAN RESPONSE - 2.582

132. Dairy Products (whole milk, ice cream, cheese, etc. -  
skim milk does not count)

MEAN RESPONSE - 3.893

133. Beef and Pork (steak, hamburger, sausage, spare ribs, etc)

MEAN RESPONSE - 4.242

134. Fried foods (chicken, french fries, potato chips, etc)

MEAN RESPONSE - 3.265

135. Butter (not margarine) and/or sour cream

MEAN RESPONSE - 2.514

## Section 13: BACKGROUND INFORMATION

### Instructions

The last section of this survey concerns your background.  
Please darken the space on the optical scan form which corresponds with your response to each question.

136. Total months in this organization is:

1 Less than 1 month

2 More than 1 month, less than 6 months

3 More than 6 months, less than 12 months

4 More than 12 months, less than 18 months

5 More than 18 months, less than 24 months

6 More than 24 months, less than 36 months

7 More than 36 months

MEAN RESPONSE - 5.401

137. Total months experience in present job is:

- 1 Less than 1 month
- 2 More than 1 month, less than 6 months
- 3 More than 6 months, less than 12 months
- 4 More than 12 months, less than 18 months
- 5 More than 18 months, less than 24 months
- 6 More than 24 months, less than 36 months
- 7 More than 36 months

MEAN RESPONSE - 5.007

138. Your race is:

- 1 American Indian or Alaskan Native
- 2 Asian or Pacific Islander
- 3 Black, not of Hispanic origin
- 4 Hispanic
- 5 White, not of Hispanic origin
- 6 Other

MEAN RESPONSE - 4.829

139. Your sex is:

- 1 Male
- 2 Female

MEAN RESPONSE - 1.384

140. Your highest educational level obtained was:

- 1 Non-high school graduate
- 2 High school graduate or GED
- 3 Some college work
- 4 Bachelor's degree
- 5 Some graduate work
- 6 Master's degree
- 7 Doctoral degree

MEAN RESPONSE - 4.254

141. How many people do you directly supervise (i.e., those for which you write performance reports)?

- |          |              |
|----------|--------------|
| 1 None   | 5 9 to 12    |
| 2 1 to 2 | 6 13 to 20   |
| 3 3 to 5 | 7 21 or more |
| 4 6 to 8 |              |

MEAN RESPONSE - 1.919

142. Does your supervisor actually write your performance report?

- 1 Yes
- 2 No

MEAN RESPONSE - 1.149

143. Your work requires you to work primarily:

- 1 Alone
- 2 With one or two people
- 3 As a small group team member (3-5 people)
- 4 As a large group team member (6 or more people)
- 5 Other

MEAN RESPONSE - 2.472

144. How stable are your work hours?

- 1 Highly stable--Routine 8 hours a day
- 2 Very stable--Nearly routine 8 hour day
- 3 Moderately stable--Shift work which periodically changes
- 4 Slightly unstable--Irregular working hours
- 5 Highly unstable--Frequent business trips or away from office

MEAN RESPONSE - 1.975

145. How stable is your work location?

- 1 Highly stable--Six to eight hours per day at one central location, office or desk
- 2 Very Stable--At least half the day at office or desk
- 3 Slightly unstable--Work predominantly away from desk
- 4 Highly unstable--Constantly on the road (i.e., traveling salesman)
- 5 Periodically unstable--Work at one location for a short period of time then another location for a short period of time (i.e., oil well driller, consultant, doctor--working hospital and office, etc)

MEAN RESPONSE - 1.552

146. Your work schedule is basically:

- 1 Shift work, usually days
- 2 Shift work, usually swing shift
- 3 Shift work, usually nights
- 4 Shift work, usually days and nights
- 5 Daily work only
- 6 Crew schedule
- 7 Other

MEAN RESPONSE - 4.717

147. Have you been diagnosed as having coronary artery disease or coronary heart disease?

- 1 Yes
- 2 No

MEAN RESPONSE - 1.957

148. Have you been diagnosed as having an ulcer?

- 1 Yes
- 2 No

MEAN RESPONSE - 1.920



149. Do you have a problem with your blood pressure?

- NA Don't Know
- 1 Yes, high blood pressure
- 2 Yes, low blood pressure
- 3 No

MEAN RESPONSE - 2.370

150. Do you have frequent or severe headaches?

- 1 Yes
- 2 No

MEAN RESPONSE - 1.753

151. If you are a jogger, the average number of miles you jog per day is:

- 1 I do not jog
- 2 1 mile
- 3 2 miles
- 4 3 miles
- 5 4 miles
- 6 5 miles
- 7 More than 5 miles

MEAN RESPONSE - 1.435

152. If you smoke cigarettes, you smoke the following number of cigarettes:

- 1 I do not smoke cigarettes
- 2 Less than 5 per day
- 3 6-10 per day
- 4 11-20 per day
- 5 21-30 per day
- 6 31-40 per day
- 7 More than 40 per day

MEAN RESPONSE - 1.773

153. If you smoke a pipe or cigar, you smoke the following number of pipe bowls or cigars:

- 1 I do not smoke a pipe or cigar
- 2 Less than 2 bowls or cigars per day
- 3 2-4 bowls or cigars per day
- 4 5-6 bowls or cigars per day
- 5 7-8 bowls or cigars per day
- 6 9-10 bowls or cigars per day
- 7 More than 10 bowls or cigars per day

MEAN RESPONSE - 1.123

154. Consult the chart on the next page to answer the following question. Your weight category (according to height) is:

MEAN RESPONSE - 5.270

155. Which statement most accurately describes your exercise program?

- 1 I do not participate in any exercise program as I get sufficient exercise through the exertions of my job
- 2 I do not exercise regularly
- 3 I participate in a light exercise program (hiking, bowling, golf)
- 4 I participate in moderate exercise program (tennis, baseball, ping pong)
- 5 I participate in a strenuous exercise program (jogging, football, swimming)

MEAN RESPONSE - 3.051

156. I participate in an exercise program:

- NA I do not participate in an exercise program
- 1 At least once a week
  - 2 At least twice a week
  - 3 At least three times a week
  - 4 At least four times a week
  - 5 At least five times a week
  - 6 More than five times a week

MEAN RESPONSE - 1.749

157. Which of the following statements best describe your marital status?

- NA Not married - No children
- 1 Married - Spouse is employed outside home
  - 2 Married - Separated due to employment
  - 3 Married - Separated by choice
  - 4 Married - Spouse is not employed
  - 5 Married - Spouse is not employed - separated due to employment
  - 6 Divorced - Do not have custody of children
  - 7 Single parent

MEAN RESPONSE - 2.288

158. If I have my own way, I will not be working for my present organization a year from now.

- 1 Strongly Disagree
- 2 Slightly Disagree
- 3 Neither Agree nor Disagree
- 4 Slightly Agree
- 5 Strongly Agree

MEAN RESPONSE - 2.644

159. I really think that I will be at this organization a year from now (i.e., US Air Force, Industry, Hospital, etc.)

- 1 Strongly Disagree
- 2 Slightly Disagree
- 3 Neither Agree nor Disagree
- 4 Slightly Agree
- 5 Strongly Agree

MEAN RESPONSE - 4.121

160. Are you currently (within the last week) taking any prescribed or non-prescribed medication?

- 1 No
- 2 Yes. If yes, then turn to the next page and fill in your identification number (the one on the upper right corner of your optical scan form) and complete the page.

APPENDIX B  
SUMMARY OF QUESTIONS

The following is a complete listing of the questions of which the stress questionnaire facets were composed. They are listed within each of the five major categories used in this research (e.g., Job Environment Facets).

Job Environment Facets

Factors and their variables:

<u>Factor</u>	<u>Variable</u>	<u>Facet</u>
4	34	Job Autonomy
	35	
5	36	Planning Time
	37	
6	39	Intergroup Conflict
	40	
7	44	Task Significance
	45	
8	47	Goal Clarity
	48	
9	49	Need for Enrichment
	50	
	51	
10	46	Group Goal Setting
	55	
11	59	Problem Solving Participation
	60	
12	56	Job Enhancement
	57	
	58	
13	64	Supervision
	65	
	66	
	67	
	68	
	69	
	70	
	71	
	72	
	73	
	74	

<u>Factor</u>	<u>Variable</u>	<u>Facet</u>
14	75 76	Supervisory Control
15	77 78	Micro Supervision
16	79 80 81 83	General Organizational Climate
17	86 87	Organizational Control
18	88 89	Coworker Relations
23	99 102	Job Satisfaction

Variables Not Included in Factors:

<u>Variable</u>	<u>Question Abstract</u>
38	Duplicate of question 46 in Factor 10 - Group Goal Setting
41	Realistic Job Performance Goals
42	Proud of Job
43	Proud of Job
52	Job Requirements in Line With Interest
53	Job Fulfills Expectations of What a Good Job Involves
54	Job Requires Communication Between Coworkers
55	Group Meetings Used to Solve Problems and Establish Goals
61	Job Provides Opportunity to Completely Finish a Piece of Work
62	Job Requires a Variety of Skills and Talents
63	Job Provides the Opportunity to be Respon- sible for Own Work
82	Inadequate Time to Do Job
84	Uncertain Job Security
85	Given Task by Other Than Supervisor
90	Things Should be Done Differently
91	Work on Unnecessary Things

<u>Variable</u>	<u>Question Abstract</u>
92	Assignment without Resources
93	Consulted on Decisions in Work Area
94	Subject to Whim of Others
95	Impossible to Lose Job
96	Progression Opportunities - Satisfaction
97	Feeling of Helpfulness - Satisfaction
98	Family Attitude Toward Job - Satisfaction
100	Job Security - Satisfaction
101	Acquired Skills - Satisfaction
136	Months in Organization
137	Months Experience in Job
141	Number Supervised
142	Whether or Not Supervisor Evaluates Performance
143	Number Working With
144	Stability of Working Hours
145	Stability of Working Location
146	Work Schedule
158	Work Intent
159	Belief in Work Intent

#### Extraorganizational Environment Facets

Factors and their variables:

<u>Factor</u>	<u>Variable</u>	<u>Facet</u>
20	108	Community/Social Activity
	109	
	110	
21	126	Family Relations
	127	
	128	
	129	
	130	

Variables not included in factors:

<u>Variable</u>	<u>Question Abstract</u>
111	Hobbies

<u>Variable</u>	<u>Question Abstract</u>
92	Assignment without Resources
93	Consulted on Decisions in Work Area
94	Subject to Whim of Others
95	Impossible to Lose Job
96	Progression Opportunities - Satisfaction
97	Feeling of Helpfulness - Satisfaction
98	Family Attitude Toward Job - Satisfaction
100	Job Security - Satisfaction
101	Acquired Skills - Satisfaction
136	Months in Organization
137	Months Experience in Job
141	Number Supervised
142	Whether or Not Supervisor Evaluates Performance
143	Number Working With
144	Stability of Working Hours
145	Stability of Working Location
146	Work Schedule
158	Work Intent
159	Belief in Work Intent

#### Extraorganizational Environment Facets

Factors and their variables:

<u>Factor</u>	<u>Variable</u>	<u>Facet</u>
20	108	Community/Social Activity
	109	
	110	
21	126	Family Relations
	127	
	128	
	129	
	130	

Variables not included in factors:

<u>Variable</u>	<u>Question Abstract</u>
111	Hobbies



<u>Variable</u>	<u>Question Abstract</u>
112	Active Social Life
113	Satisfaction from Things Enjoyed
114	Community Life Interferes with Work
115	Feeling Guilty When Not Working on Career
116	Fights for Social Acceptance

#### Perceived Stress

Organizational Stress = V118

Extraorganizational Stress = (V119 + V120)/2

Total Stress = V118 + V119 + V120

#### Perceived Productivity

Factor and its variables:

<u>Factor</u>	<u>Variables</u>	<u>Facet</u>
3	30 31 32 33	Perceived Productivity

#### Individual Traits

Factors and their variables:

<u>Factors</u>	<u>Variables</u>	<u>Facet</u>
1	1 2 3 4 5 6 7 8 9 11 12	Locus of Control
2	21 22 23 28 29	Type A/B Behavior

<u>Factor</u>	<u>Variable</u>	<u>Facet</u>
19	103 104 105 106 107	Assertiveness
22	155 156	Exercise
24	121 122 123 124	Tolerance for Change
25	133 134	Dietary Fat

Variables Not Included in Factors:

<u>Variable</u>	<u>Question Abstract</u>
10	What Happens is Usually Own Doing
13	Breaks Make Manager
14	Responsible for Own Mistakes
15	Aggressiveness (Type A/B)
16	Time Urgency (Type A/B)
17	Impatience (Type A/B)
18	Time Urgency (Type A/B)
19	Aggressiveness (Type A/B)
20	Ambitiousness (Type A/B)
24	Assertiveness
25	Ambitiousness
26	Try to Do Too Much
27	Impatience (Type A/B)
125	Hard to Stop Something Started
131	Frequency of Eating Eggs
132	Frequency of Eating Dairy Products
135	Frequency of Eating Butter/Sour Cream
138	Race
139	Sex
140	Education Level
147	Diagnosed CHD
148	Diagnosed Ulcer

<u>Variable</u>	<u>Question Abstract</u>
149	Blood Pressure Problems
150	Frequent Severe Headaches
151	Average Miles Jogged
152	Cigarette Smoking
153	Cigar Smoking
154	Height/Weight
157	Marital Status
160	Medication

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